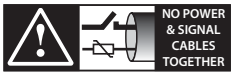
gaSteam 45/90/180 HD003
45/90/180 HD103

microprocessor electronic controller

ENG User manual

LEGGI E CONSERVA QUESTE ISTRUZIONI

READ AND SAVE THESE INSTRUCTIONS



READ CAREFULLY IN THE TEXT!

High Efficiency Solutions

IMPORTANT WARNINGS

The CAREL humidifiers are advanced products, whose operation is specified in the technical documentation supplied with the product or can be downloaded, even prior to purchase, from the website www.carel.com. Each CAREL product, in relation to its advanced level of technology, requires setup/configuration/programming/commissioning to be able to operate in the best possible way for the specific application. The failure to complete such operations, which are required/indicated in the user manual, may cause the final product to malfunction; CAREL accepts no liability in such cases.
The customer (manufacturer, developer or installer of the final equipment) accepts all liability and risk relating to the configuration of the product in order to reach the expected results in relation to the specific final installation and/or equipment. CAREL may, based on specific agreements, acts as a consultant for the installation/commissioning/use of the unit, however in no case does it accept liability for the correct operation of the humidifier and the final installation if the warnings or suggestions provided in this manual or in other product technical documents are not heeded. In addition to observing the above warnings and suggestions, the following warnings must be heeded for the correct use of the product:

DANGER OF ELECTRIC SHOCK
The humidifier contains live electrical components. Disconnect the mains power supply before accessing inside parts or during maintenance and installation;
DANGER OF WATER LEAKS
The humidifier automatically and constantly fills/drains certain quantities of water. Malfunctions in the connections or in the humidifier may cause leaks;
DANGER OF BURNS
The humidifier contains high temperature components and delivers steam at 100°C/212°F.

In the event where there is no demand for steam production for a period exceeding 24 hours, the unit will automatically empty the cylinder, so as to avoid stagnation of the water inside. It is recommended to manually empty the cylinder before switching off the unit at the main switch.
The conditions of the environment, the fuel and the power supply voltage must comply with the specified values.
All other uses and modifications made to the appliance that are not authorised by the manufacturer are considered incorrect.
Liability for injury or damage caused by the incorrect use of the appliance lies exclusively with the user.
Please note that the appliance is connected to the gas mains, contains live electrical devices and hot surfaces.
All service and/or maintenance operations must be performed by specialist and qualified personnel who are aware of the necessary precautions and are capable of performing the operations correctly and in accordance with the safety standards and legislation in force, with specific reference to:
1. Italian law 1083/71: "Safety standards relating to the use of gaseous fuel";
2. Italian Law no. 46/90: "Safety standards relating to systems in buildings";
3. Italian Presidential Decree no. 447, December 6, 1991: "Regulations for the enforcement of law no. 46, dated March 5, 1990, on safety relating to systems in buildings";
4. Italian Law 10/91: "Regulations for the enforcement of the national plan for energy savings and the development of renewable sources of energy".

Il settaggio di tutte le unità (sottostanti alla normativa UL - 998) per funzionamento da Gas naturale (settaggio di fabbrica) a gas GPL dovrà essere effettuato esclusivamente da personale Carel o Service Carel.
Disconnect the appliance from the mains power supply before accessing any internal parts. The local safety standards in force must be applied in all cases.

Warning:

The installation of the product must include an earth connection, using the special yellow-green terminal available in the humidifier.

The environmental and power supply conditions must conform to the values specified on the product rating labels.
The product is designed exclusively to humidify rooms either directly or through distribution systems (ducts).
Only qualified personnel who are aware of the necessary precautions and able to perform the required operations correctly may install, operate or carry out technical service on the product.
Only water with the characteristics indicated in this manual must be used for steam production.
All operations on the product must be carried out according to the instructions provided in this manual and on the labels applied to the product. Any uses or modifications that are not authorised by the manufacturer are considered improper. CAREL declines all liability for any such unauthorised use. Do not attempt to open the humidifier in ways other than those specified in the manual.
Observe the standards in force in the place where the humidifier is installed.
The appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.
Do not install and use the product near objects that may be damaged when in contact with water (or condensate). CAREL declines all liability for direct or indirect damage following water leaks from the humidifier.
Do not use corrosive chemicals, solvents or aggressive detergents to clean the inside and outside parts of the humidifier, unless specifically indicated in the user manual.
Do not drop, hit or shake the humidifier, as the inside parts and the linings may be irreparably damaged.

CAREL adopts a policy of continual development. Consequently, CAREL reserves the right to make changes and improvements to any product described in this document without prior warning. The technical specifications shown in the manual may be changed without prior warning.
The liability of CAREL in relation to its products is specified in the CAREL general contract conditions, available on the website www.carel.com and/or by specific agreements with customers; specifically to the extent where allowed by applicable legislation, in no case will CAREL, its employees or subsidiaries be liable for any lost earnings or sales, losses of data and information, costs of replacement goods or services, damage to things or people, downtime or any direct, indirect, incidental, actual, punitive, exemplary, special or consequential damage of any kind whatsoever, whether contractual, extra-contractual or due to negligence, or any other liabilities deriving from the installation, use or impossibility to use the product, even if CAREL or its subsidiaries are warned of the possibility of such damage.

DISPOSAL

The humidifier is made up of metal parts and plastic parts. In reference to European Union directive 2002/96/EC issued on 27 January 2003 and the related national legislation, please note that:
1. WEEE cannot be disposed of as municipal waste and such waste must be collected and disposed of separately;
2. the public or private waste collection systems defined by local legislation must be used. In addition, the equipment can be returned to the distributor at the end of its working life when buying new equipment;
3. the equipment may contain hazardous substances: the improper use or incorrect disposal of such may have negative effects on human health and on the environment;
4. the symbol (crossed-out wheeled bin) shown on the product or on the packaging and on the instruction sheet indicates that the equipment has been introduced onto the market after 13 August 2005 and that it must be disposed of separately;
5. in the event of illegal disposal of electrical and electronic waste, the penalties are specified by local waste disposal legislation.

Warranty on the materials: 2 years (from the date of production, excluding consumables).

Approval: the quality and safety of CAREL products are guaranteed by the ISO 9001 certified design and production system, as well as by the CE and ETL mark.

1. GENERAL CHARACTERISTICS OF THE MAIN CONTROL BOARD 7

2. CONTROL SIGNALS FROM THE FIELD 8

2.1 Humidity or temperature control ... 8
2.2 Pin strip position on the board for probe configuration ... 9
2.3 Using other brand probes ... 9

3. AUXILIARY CONTACTS 10

3.1 Production status contact ... 10
3.2 Alarm contact ... 10
3.3 Dehumidification contact ... 10
3.4 Remote terminal ... 10
3.5 GSM network connection (send SMS) ... 11
3.6 Supervisory network ... 11
3.7 Checks ... 11

4. USER INTERFACE 12

4.1 pGD1 graphic display (CAREL P/N: PGD1PH0F00) ... 12
4.2 Main menu ... 13
4.3 User menu ... 13
4.4 Installer ... 15
4.5 Maintenance ... 24

5. STARTING, SHUTTING DOWN AND ADVANCED FUNCTIONS 26

5.1 Start-up ... 26
5.2 Shutting down the unit ... 26
5.3 Manually draining the boiler ... 26
5.4 Cascading control of other units ... 26

6. ALARMS, TROUBLESHOOTING 28

6.1 Alarms ... 28
6.2 Alarm management and signals ... 28

7. OPERATING AND CONTROL PRINCIPLES, OTHER FUNCTIONS 31

7.1 Operating principle ... 31
7.2 Control principles ... 31
7.3 Other functions ... 32
7.4 Controlling the board via the network ... 33

1. GENERAL CHARACTERISTICS OF THE MAIN CONTROL BOARD

Fig. 1.a

This is a microprocessor electronic controller developed by CAREL for the management of all models of humidifier.
It is made up of two electronic boards, positioned one on top of the other and connected together by pin strip:

- bottom board - "main control board": connected to the board with the microprocessor and the clock card, as well as the serial card;
- top board, or "expansion board".

The controller is designed to run the control program, and is fitted with the set of terminals required for connection to the controlled devices (for example: valves, power contactors) and to the field (probes, external controller).

The program and the parameters are saved in FLASH MEMORY, meaning the data is safe even in the event of a power failure (without the need for a backup battery).

The controller can be connected to pLAN (pCO Local Area Network) and tLAN networks.

Connection to the supervisor/telemaintenance serial line on the RS485 standard is ensured by fitting the controller with optional cards, using the CAREL, Modbus® or ECHELON®, RS232 and GSM communication protocols.

Terminal blocks

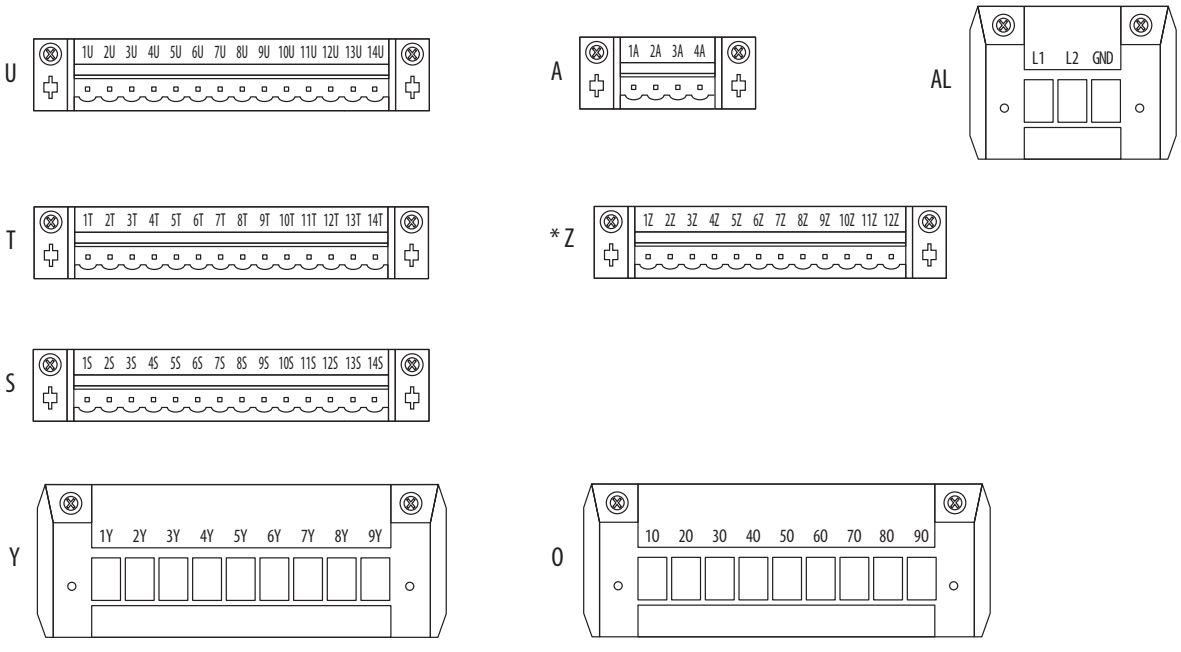


Fig. 1.b

2. CONTROL SIGNALS FROM THE FIELD

2.1 Humidity or temperature control

The humidifier can be configured to ensure the desired humidity or temperature value. It can be controlled in the following four different ways:

a) Type C control: ON/OFF

The humidifier is operated by a mechanical humidistat H, by a voltage-free remote contact CR, or by a combination of the two, which must be connected to terminals 7U, 8U, 9U and 10U on terminal block U in the electrical panel.

The diagrams in Fig. 2.b show the connections to be made in the case of:

a) operation controlled by a simple remote contact (CR);

b) operation by external mechanical humidistat (H);

c) a combination of the two.

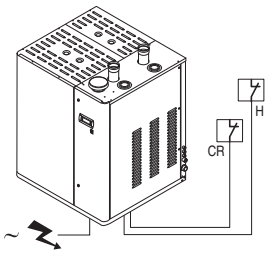


Fig. 2.a

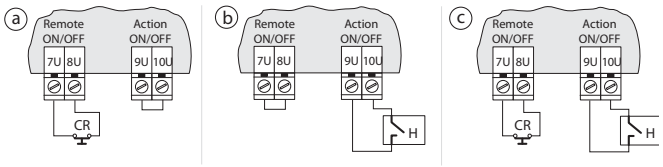


Fig. 2.b

b) Type P control:

proportional control, with signal sent by an external controller.

Steam production is managed by an external controller R, which sends the controller a humidity request signal (Fig. 2.c); the controller can be programmed to receive one of the following proportional signals (see par. 7.2):

- voltage: 0 to 1 Vdc; 0 to 10 Vdc; 2 to 10 Vdc;
- current: 0 to 20 mA , 4 to 20 mA.

The reference (zero) of the external controller must be connected to the GND terminal (2U) and the control signal to terminal B1 on terminal block U.

To avoid unstable control, the earth of the external controller must be connected to the earth of the controller.

This type of control can also be used with an enabling contact (CR) connected to the "Remote ON/OFF" terminal.

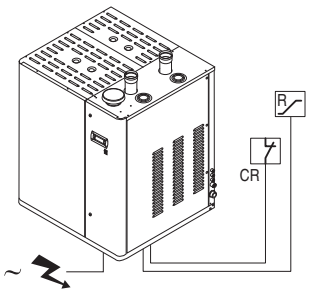


Fig. 2.c

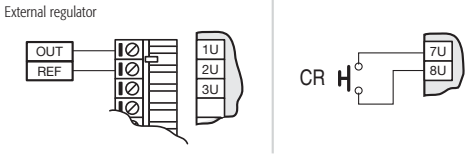


Fig. 2.d

c) Type H control:

humidity control with room probe (and outlet limit probe, if required).

With this configuration (see Fig. 2.e) the main control board, connected to a humidity probe HT, performs a complete control action according to the humidity measured.

An outlet humidity limit probe (see Fig. 2.f) can also be connected: with this configuration, the main control board, connected to a humidity probe HT, performs a complete control action, while also limiting the steam production according to the relative humidity value in the outlet duct, measured by the probe CH.

The diagrams shown in Fig. 2.g indicate the connection to be made using CAREL probes, with:

- just one relative humidity probe (a);
- an outlet humidity limit probe (b).

CAREL PROBES AVAILABLE

rooms	air ducts	industrial applications
DPWC111000	DPDC110000	DPPC210000
	DPDC210000	DPPC110000

Tab. 2.a

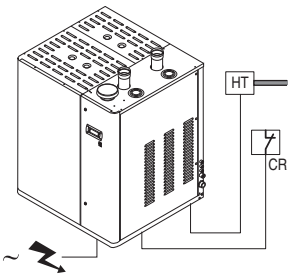


Fig.2.e

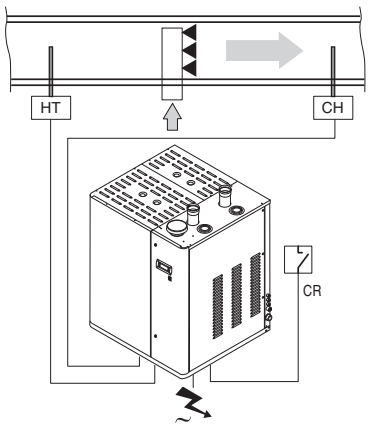


Fig.2.f

The controller can also be connected to non-CAREL probes (see par. 2.3.).

HT: CAREL relative humidity probe;
CH: CAREL outlet relative humidity probe.

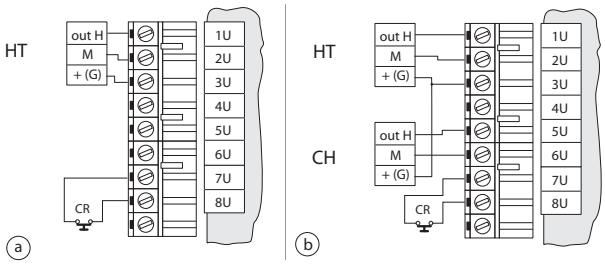


Fig. 2.g

d) Control for steam baths:
Temperature control with room temperature probe
Temperature control with room temperature probe
The humidifier is connected to a temperature probe TT (see Fig. 2.h), and performs a complete control action according to the temperature measured inside the controlled environment.
Fig. 2.i shows the connection of the CAREL probe model ASET03001, with a range of measurement -30T90°C. The recommended CAREL probes have a 0 to 1 Volt output, and therefore the range of reading must be set (see par. 4.4.4). The control signal must be connected to 1U, and the earth reference is GND (2U).
The controller can also be connected to non-CAREL active probes (see par. 2.3).

TT: CAREL temperature probe.

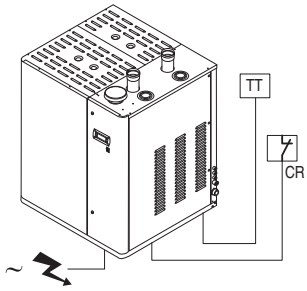


Fig. 2.h

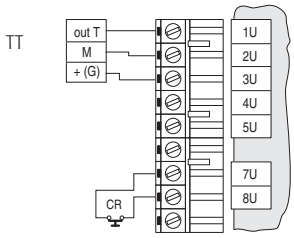


Fig.2.i

Connection to NTC CAREL probe:

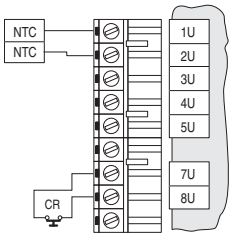


Fig. 2.l

2.2 Pin strip position on the board for probe configuration

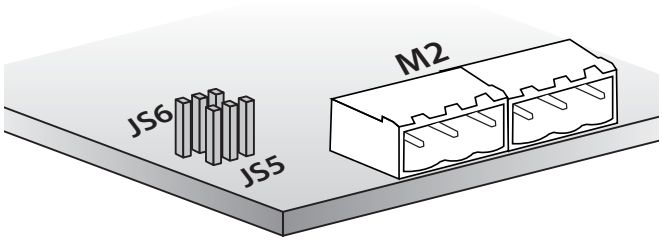


Fig. 2.m

pin strip	configuration	position	
		0 to 10 Vdc 2 to 10Vdc	0 to 1 Vdc, 4 to 20/0 to 20 mA, NTC probes
JS5	main probe	basic configuration	
JS6	limit probe	basic configuration	

Tab. 2.b

2.3 Using other brand probes

Different brand probes can also be used, with the output signals, selectable from the following standards:
- voltage: 0 to 1 Vdc, 0 to 10 Vdc, 2 to 10 Vdc;
- current: 4 to 20/0 to 20 mA.

In addition, the minimum and maximum values of the signal must be set (see par. 4.4.4).

A 15 Vdc power supply is available for the probes, terminal 3U.

The control signals must be connected:
- for the control probe HT (or TT) to terminal 1U, the earth reference for which is GND (2U);
- for the limit probe CH to terminal 5U, the earth reference for which is GND (6U);
- for the current probe to terminal 4U, the earth reference for which is GND (6U).

Important warnings:
- To avoid unstable control, the earth of the probes or the external controllers must be connected to the earth on the appliance's controller.
- For the operation of the humidifier, the terminals corresponding to the "remote ON-OFF" signal must be connected to an enabling contact or jumpered (default solution). If these terminals are not connected, all the internal and external devices managed by the controller are disabled, with the exception of the drain pump, limited to the drain cycle due to extended inactivity (see par. 7.3).

NOTE: for industrial environments (EN 61000-6-2) the cables that leave the unit must not exceed 30 m in length, except for the main probe (terminal M2 pins 1-2-3-4-5-6), the remote on/off digital input (terminal M2 pins 7-8) and the shielded RS485 communication cables.

NOTE: the RS485 serial GND should not be earthed.

3. AUXILIARY CONTACTS

3.1 Production status contact

The humidifier expansion card features a voltage-free contact for remote signalling of the unit operating status (Production/No production).

This normally-open contact is available on connector J5 of the expansion card, as highlighted below:

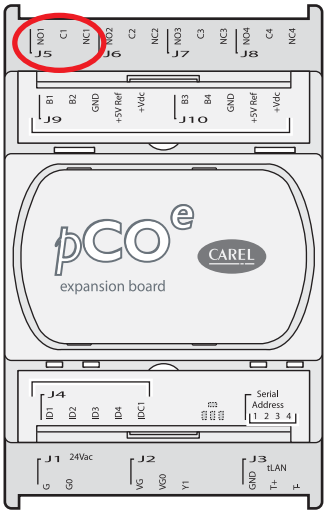


Fig. 3.a

3.2 Alarm contact

The humidifier controller is fitted with a voltage free contact for the remote alarm signal (one or more events). The alarm contact is connected via terminals 70, 80 and 90, as shown in Fig. 3.a.

electrical specifications
250 Vac; Imax: 8 A resistive 2 A inductive

Tab. 3.a

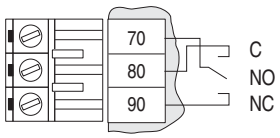


Fig. 3.a

3.3 Dehumidification contact

When the humidifier is used as in case c) in paragraph 2.1 (relative humidity control), a contact (NO, voltage-free) can be used to activate an external dehumidification device; in this case, the humidifier can provide complete control over the ambient relative humidity. The dehumidification contact is connected via terminals 13U, 14U on terminal block U, as shown in Fig. 3.b. For further details, see par. 4.4.11.

electrical specifications
250 Vac; Imax: 8 A resistive 2 A inductive

Tab. 3.b

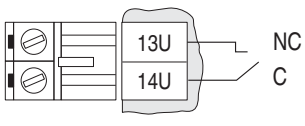


Fig. 3.b

3.4 Remote terminal

The display terminal can be detached from the humidifier and moved to another place.
Depending on the distance required, the following are necessary:

- up to 50 metres: 6-wire telephone cable and two EMC filters (code 0907858AXX) (see Fig. 5.a);
- up to 200 metres: two CAREL TCONN6J000 boards, 6-wire telephone cables and an AWG20-22 shielded cable with 3 twisted pairs (for the connection of the two boards, Fig. 5.b).

Remote connection of the terminal up to max 50 m

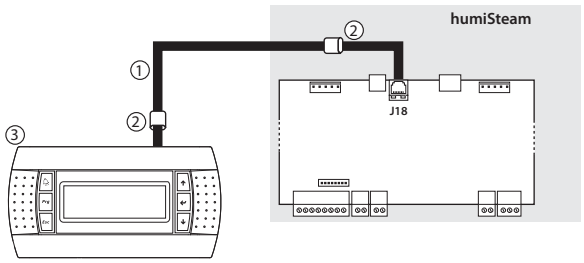


Fig. 3.c

Key:

1 telephone cable (up to 50 m distance);
2 EMC filters (code 0907858AXX) to be applied to the ends of the telephone cable;
3 remote display terminal.

Remote connection of the terminal up to 200 m

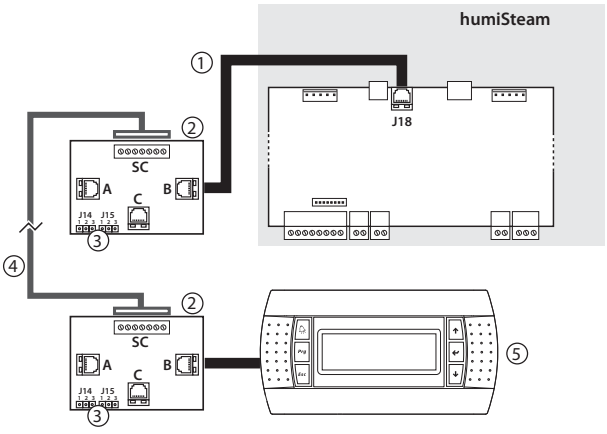


Fig. 3.d

Key:

1 telephone cable (up to 0.8 m distance);
2 CAREL TCONN6J000 board;
3 pin strip J14 and J15 in position 1-2 (power supply available on the telephone connectors A, B and C and screw SC);
4 WG20-22 shielded cable with 3 twisted pairs to move the display terminal up to 200 m away. Connection to the TCONN6J00 board:

terminal SC	function
0	EARTH (shield)
1	+VRL
2	GND
3	RX/TX-
4	RX/TX+
5	GND
6	+VRL

5 remote display terminal

3.5 GSM network connection (send SMS)

The humidifier can be configured to send SMS message for alarms and malfunctions (see menu installer > supervisor > GSM protocol).

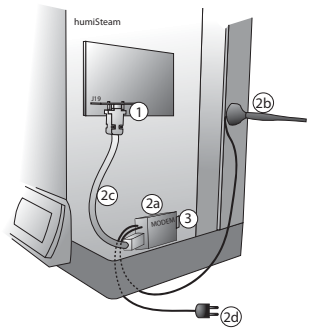


Fig. 3.e

Key:

1 electronic board PCOI00MDM0 (to be connected to connector J19 on the humidifier board)

2
- CAREL GSM kit PLW0P65M00, made up of:
- 2.a modem
- 2.b antenna (with magnetic base)
- 2.c serial cable
- 2.d power supply

3 SIM card to be inserted in the modem. Make sure that the access password (PIN number) is not enabled

3.6 Supervisory network

The controller can also be connected to a supervisory system via RS485, RS232 serial lines or FTT10 LON using the optional cards shown in the following table.

optional cards	characteristics supported	protocols
PCO1000WB0	provides BACnet 8802.3 Ethernet, BACnet/IP and MS/TP connectivity	BACnet™
PCO1000BA0	Provides BACnet MS/TP over RS485	BACnet™
PCO100MDM0	used for the direct interface of the controller to an RS232 network with an external modem	CAREL for remote connections
PCO10000F0	used to interface of the controller to an FTT10 LON network, when suitably programmed	LON-Echelon®

Tab. 3.c

Connection is also possible to TREND systems using a card sold directly by TREND.

3.7 Checks

The following conditions represent correct electrical connection:
- the rated voltage of the appliance corresponds to the mains voltage;
- the fuses installed are suitable for the line and the power supply voltage;
- mains disconnecting switch has been installed so as to be able to disconnect power to the humidifier;
- the electrical connections have been performed as shown in the diagrams;
- the power cable is secured to the tear-proof cable clamp;
- terminals 7U-8U are jumpered or connected to an enabling contact;
- the earth of any non-CAREL probes is connected to the earth on the controller;
- if the appliance is controlled by an external controller, the earth of the signal is connected to the earth of the controller.

4. USER INTERFACE

4.1 pGD1 graphic display (CAREL P/N: PGD1PH0F00)

The pGD1 graphic display is an electronic device that allows complete management of humidifier operation. The graph display features both icons and alphanumeric characters.
It can operate over a wide temperature range (-20T60 °C) and guarantees a high degree of ingress protection (IP65). The terminal is a "plug&play" device, and as such is automatically detected and managed by the control board.
The pGD1 graphic display (32 columns x 8 rows) also comes with backlighting.

4.1.1 Keypad

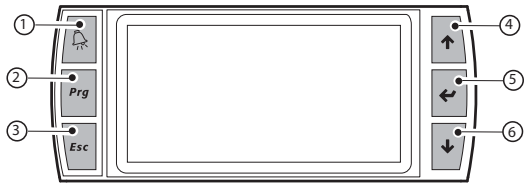


Fig. 4.a

button		function
(1)	ALARM	list of active alarms and reset any alarms shown
(2)	PRG	access the main menu
(3)	ESC	return to previous screen/display
(4)	UP	circular navigation inside the menus, the screens, the parameters and the values of the parameters
		from the "main" screen, access the INFO screens
(5)	ENTER	select and confirm (like the "Enter" key on a computer keyboard)
		from the "main" screen, access the "SET" screen
(6)	DOWN	circular navigation inside the menus, the screens, the parameters and the values of the parameters
		from the main screen, access the warning screens

Tab. 4.a

4.1.2 "Main" screen

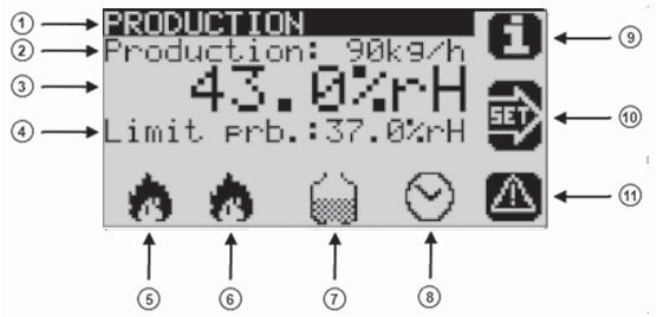


Fig. 4.b

symbol	function
(1)	indicates unit operating status (*)
(2)	indicates current production
(3)	value read according to the type of signal connected
(4)	value read by the limit humidity probe
(5)	indicates the status of burner 1 (**)
(6)	indicates the status of burner 2 (**)
(7)	indicates the water level in the boiler (***)
(8)	indicates the status of the scheduler
(9)	"Info" screen icon
(10)	"Quick Set" screen icon
(11)	indicates the alarms in the log/alarm log icon

Tab. 4.b

(*) Descriptions:
- PRODUCTION: Steam production in progress;
- ALARM: Steam production disabled due to an alarm;
- OFF FROM SUPERVISOR: Steam production disabled from the supervisor;
- OFF FROM SCHEDULER: Steam production disabled during the set time band;
- OFF FROM REMOTE: Steam production disabled by opening the "Remote ON/OFF" contact;
- OFF FROM KEYPAD: Steam production disabled from the keypad;
- MANUAL MANAGEMENT: I/O active manual management;
- ACTIVE AUTOTEST.: autotest function in progress;
- READY: Unit ready for operation, but no steam demand;
- PRE-PURGE: pre-purge actived;
- ANTIFREEZE: antifreeze actived;
- PRE-HEATING water pre-heating actived

(**) Icons

: Burner off;
: Burner in pre-purge stage;
: Burner in steam production stage;
: Burner alarm;
: Burner waiting to be launched

(***) Icons

: level of the water is below the low level;
: level of the water in the boiler is in low level;
: level of the water is in medium level;
: level of the water is in high level.

During the fill-drain water and autotesting operation, will appear on the icon, a flashing message to highlight the operations in progress:
- "Drain": during the drain for dilution;
- "Fill": during the fill of the water;
- "Auto Test" during the autotest process.

4.1.3 "INFO" screens (read-only)

Series of read-only screens for displaying the main unit status values. To access, press UP from the "Main" screen. There are four "INFO" screens; to move from one screen to the next, press UP or DOWN. Press ESC to return to the "Main" screen.

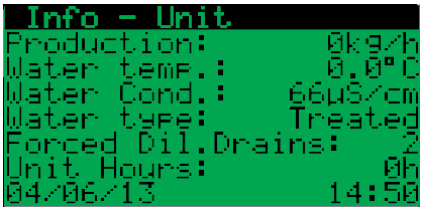


Fig. 4.c

info shown on display	value and notes	unit of measure
info – Unit	heading	
Production	current unit production	kg/h
Water cond.	water conductivity value measured	µS/cm2
Water type	type of water used (*)	
Dil drain cycles	number of evaporation cycles before running a drain to dilute (*)	
Unit hours	operating hours of the GaSteam unit	h
Date and time	date and time	

Tab. 4.c

Note:
(*) The type of water used can be selected by the installer; if choosing "treated" (default), the number of evaporation cycles before running a drain to dilute cycle will also be displayed.

Fig. 4.d

info shown on display	value and notes	unit of measure
info – Burner	heading	
Status	operating status of the corresponding burner (*)	
Production	current production of the corresponding burner	kg/h
Fan:	speed of the corresponding fan	rpm
T. flue gas:	flue gas discharge temperature	°C/°F
Op. hours	operating hours of the corresponding burner	h
Date and time	date and time	

Tab. 4.d

(*) Descriptions
- OFF: Burner off;
- PRE-PURGE: Burner in pre-purge stage;
- PRODUCTION: Burner in steam production stage;
- ALARM: Burner alarm.

4.1.4 "Quick set" screen

Used to set the main values of the humidifier.
From the "main" screen, press:
- ENTER to access the menu;
- ENTER to move from one value to the next;
- UP and DOWN to modify the selected value;
- ENTER to confirm and move to the next value.

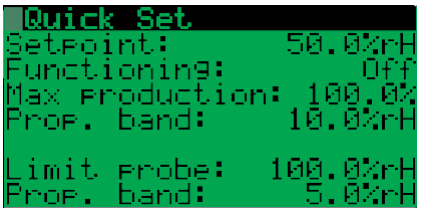


Fig. 4.e

Info shown on display	Value and notes	Default	Unit of measure
Quick Set	Heading		
Set point (*)	Temperature or humidity set point	50%rH or 30°C / 86°F	%rH or °C/°F
Status	Auto (in control) or OFF	Auto	
Maximum prod.	Maximum capacity available as a percentage of rated capacity	100%	%
Prop. band	Proportional band (modulation)	10.0	%rH
Limit probe	Limit humidity (limit probe)	100.0	%rH
Prop. band	Proportional band for the limit probe (modulation)	5.0	%rH

Tab. 4.e

4.1.5 "Warnings" screen

The warnings screen displays messages generated by events that are resolved independently, and the complete alarm log.
(see 4.5.4 and 6.1)

4.2 Main menu

To access press PRG from the main screen
Buttons:
- UP and DOWN: navigation inside the submenus, screens, and range of values and settings;
- ENTER: confirm and save the changes made;
- ESC: to go back (pressed more than once returns to the "Main" screen)

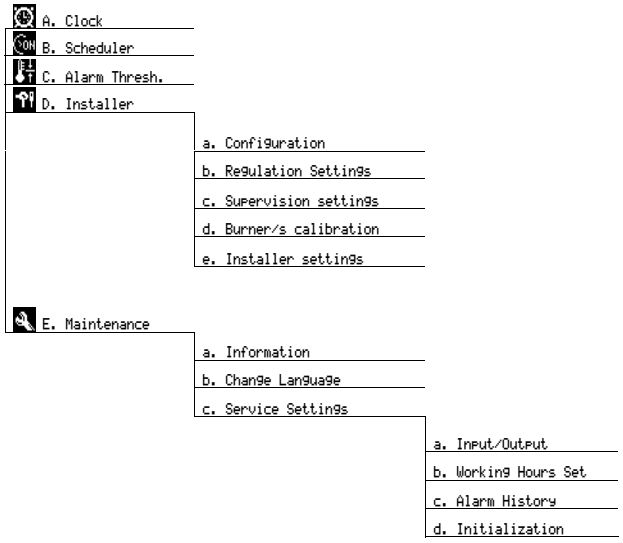


Fig. 4.f

4.3 User menu

From the main screen, press:
- PRG to access the main menu;
- UP/DOWN to move between the submenus;
- ENTER to enter the submenu
- ENTER to select the parameter and move between the parameters;
- UP/DOWN to modify the parameter;
- ENTER to confirm the selected parameter and go to the next parameter;
- ESC to return to the previous menu.

To navigate inside the screens:
- UP or DOWN to modify the value (within the options/range),
- ENTER to confirm and move the cursor to the next value
- ESC to return to the main menu.

The user menu comprises three submenus, which can be accessed without entering a password:

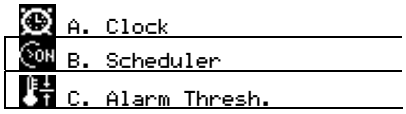


Fig. 4.g

4.3.1 Clock

The Clock submenu comprises two screens, used to set the time, the date, the date format and manage the daylight saving time.

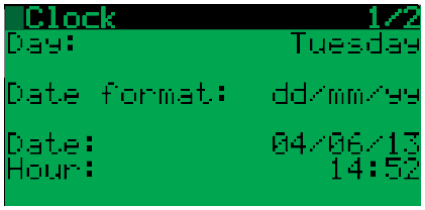


Fig. 4.h

info shown on display	value and notes	Default	unit of measure
Clock	heading		
Day	day of the week (set automatically)		
Date format	date format	dd/mm/yy	
Date	Current date		
Time	Current time		h

Tab. 4.f

Fig. 4.i

Info shown on display	Value and notes	Default	unit of measure
Clock	heading		
Daylight saving	enable function	Enabled	
Changeover time	changeover difference in minutes	60	Min
Start	day when changeover starts		
In – at	month and hours when changeover starts		
End	day when changeover ends		
In - at	month and hours when changeover ends		

Tab. 4.g

Daylight saving management requires a number of parameters to be set to ensure correct operation.

Changeover time: parameter that determines the number of minutes added to or subtracted from the time on changing to DST.

Start identifies the day and time when changeover starts.
This is a relative setting, not based on the date, but rather the day of the corresponding week.
Four fields must be entered to set this parameter:
- Week selection (options available: First, Second, Third, Fourth, Last);
- Day selection;
- Month selection
- Changeover start time

The same settings are required for the end of the changeover (changing back from DST).

4.3.2 Scheduler

To navigate around the screen:
- UP or DOWN to modify the value (within the options/range);
- ENTER to confirm and move the cursor to the next value
- ESC to return to the main menu.

Inside the scheduler setting screen
- UP or DOWN to modify the value (within the options/range),
- ENTER to confirm and move the cursor to the next value;
- PRG (from first field) to copy the scheduler settings to the next day;
- ESC (from any parameter) to return to the first field.
- ESC (from the first field) to return to the main menu.

The Scheduler submenu comprises two screens, used to enable/disable the function and set the time bands

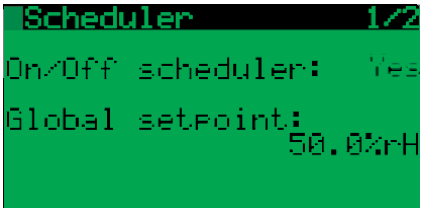


Fig. 4.j

info shown on display	value and notes	Default	unit of measure
Scheduler On/Off	Enable scheduler	No	
Global set point (*)	Global set point setting	50%rH - 30°C/86°F	%rH - °C/°F

Tab. 4.h

Note:
* When ON/OFF programming is enabled, the value of the reference scheduler set point is shown.
The reference set point is set on the main screen.
When the scheduler is active, the display shows the clock symbol .

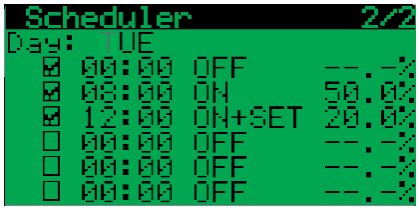


Fig. 4.k

info shown on display	value and notes	Default	unit of measure
Scheduler	heading		
Day	time band day		
☑	enable/disable time band		
09:00	time band start time		
ON+SET	type of band (ON, ON+SET, OFF)		
50.0%	time band set point		

Tab. 4.i

Six time bands for unit on and off and set point variation can be selected over a 24h period.

E.g.:

Day: MON			
☑	08:00	ON+SET	65.0%rH
☑	09:00	ON	50.0% (global set point)
☑	12:00	OFF	--.-
☑	14:00	ON+SET	65.0%rH
☑	15:00	ON	50.0% (global set point)
☑	20:00	OFF	--.-

Tab. 4.j

With this configuration:

On Monday
- At 08.00 the humidifier is switched on, with a set point of 65.0%rH (different from the global set point, configured on the "Quick Set" screen).
- At 09.00 the set point changes to 50.0%rH (global set point, configured on the "Quick Set" screen);
- At 12.00 the humidifier is switched off;
- At 14.00 the humidifier is switched on, with a set point of 65.0%rH;
- At 15.00 the set point changes to 50.0%rH (global set point);
- At 20.00 the humidifier is switched off.

It then stays off until the first ON setting the next day.

Note:
The same configuration can be copied to the other days of the week by pressing PRG (COPY).

Note:
If the type of control is set as "ON/OFF", "External proportional signal" or "Proportional value from the supervisor", the global set point and the time band set point settings will not be available .
The scheduler function can still be used, as follows:

- OFF: during this stage the humidifier will be off;
- ON: during this stage the humidifier will operate based on the room humidity request signal (external proportional signal), the on/off digital input (ON/OFF control mode) or the request from the supervisor (proportional value from the supervisor).

4.3.3 Alarm threshold (humidity or temperature control only)

The alarm threshold submenu (available only with humidity/humidity + limit or temperature control mode) is used to set the high and low room humidity/temperature alarm thresholds and, if the limit probe is fitted, the high humidity limit alarm threshold.

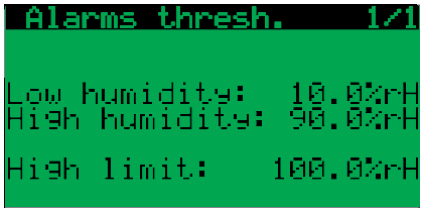


Fig. 4.l

info shown on display	value and notes	Default	unit of measure
Alarm threshold	heading		
Low humidity/ temperature	low humidity/temperature threshold alarm	10%rH -	%Rh - °C/°F
High humidity/ temperature	high humidity/temperature threshold alarm	90%rH – 60°C/	%Rh - °C/°F
High limit humid.	high limit humidity threshold alarm	100%rH	%rH
ON+SET	type of time band (ON, ON+SET, OFF)		
50.0%	time band set point		

Tab. 4.k

4.4 Installer

From the main screen, press:
- PRG to access the main menu;
- UP/DOWN to move between the submenus;
- ENTER to enter the submenu
- ENTER to select the parameter and move between the parameters;
- UP/DOWN to modify the parameter;
- ENTER to confirm the selected parameter and go to the next parameter;
- ESC to return to the previous menu.

To navigate inside the screens:
- UP or DOWN to modify the value (within the options/range),
- ENTER to confirm and move the cursor to the next value
- ESC to return to the main menu.

The Installer menu provides access to the Installer parameters for general humidifier configuration.

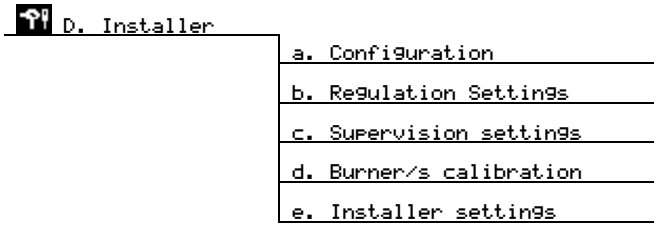


Fig. 4.m

4.4.1 Configuration

The Configuration menu contains all the Installer parameters corresponding to the general humidifier configuration. These must only be modified by qualified personnel.

Configuration parameters:

Screen	Display	Range		Default	UOM	Accessible	Description
1/6	Control mode	ON/OFF contact External proportional signal Humidity control Humidity + Limit humidity Temperature control Ext sig. + Lim Humidity		-	-	Always	Humidifier control mode (see Chap. 7)
	Unit of measure	°C – kg/h °F – lb/h		°C – kg/h	-	Always	Unit of measure used on the humidifier
2/6	Main probe	0/1V 2/10V 0/10V 0/20 mA 4/20 mA 0/135Ω 135/1000Ω	Humidity control/ external proportional signal	0/1V	-	In Humidity, Humidity + Limit humidity, Temperature, External proportional signal control mode.	Type of room probe input
		NTC 0/1V 2/10V 0/10V 0/20 mA 4/20 mA	Temperature control	0/1V	-		
	Maximum value	(minimum value) – 250.0		100.0	%rH - °C/°F	In Humidity, Humidity + Limit humidity, Temperature control mode	Maximum value that can be read by the control room probe
	Minimum value	0.0 – (maximum value)		0.0	%rH - °C/°F		Minimum value that can be read by the control room probe
	Offset	0.0 – 99.9		0.0	%rH - °C/°F		Room probe reading offset
3/6	Limit probe	0/1V 2/10V 0/10V 0/20 mA 4/20 mA 0/135Ω 135/1000Ω		0/1V	-	In Humidity + Limit humidity control mode	Type of limit probe input
	Maximum value	(minimum value) – 250.0		100.0	%rH	In Humidity + Limit humidity control mode	Maximum value that can be read by the limit probe
	Minimum value	0.0 – (maximum value)		0.0	%rH		Minimum value that can be read by the limit probe
	Offset	0.0 – 99.9		0.0	%rH		Limit probe reading offset
4/6	Type of water	Mains Treated		mains	-	Always	Type of supply water used in the humidifier
	Evap. cycles before drain cycle	1 – 4		2	-	If treated water selected	Number of evaporation cycles before running a drain cycle and refilling with water
5/6	Burner sequence (GaSteam 180 only)	Series Parallel		Parallel	-	Always	Operating mode (see Chap. 9 "Operating principles")
	Seq. hysteresis (GaSteam 180 only)	0.0 – 20.0		5.0	%	Always	Hysteresis for burner stop/start only in series or parallel with rotation burner sequence (see "setting the operating sequence of the two burners") UG180
6/6	Enable unit maintenance warning	Yes/no		Yes	-	Always	Enable unit maintenance warning after exceeding the threshold of 1500 hours

Tab. 4.l

4.4.2 Control mode configuration

This parameter is used to choose between 5 different control modes, as listed in the table below.

parameter name	display	description (for a detailed description see par. 7.2)
Type of control	ON/OFF contact	Humidity control with humidistat
	External prop. signal	Proportional control with signal set by an external controller
	Humidity control	Humidity control with room probe
	Humidity + Limit humidity	Humidity control with room probe and limit probe
	Temperature control	Temperature control with room probe
	Ext sig. + Lim Humidity	Proportional control with signal set by an external controller and limit humidity

Tab. 4.m

4.4.3 Type of probe

Sets the type of probe or the type of signal applied.

parameter name	display	description
Main probe(not accessible if control mode is ON/OFF contact)	0/1V	Humidity control/external proportional signal
	2/10V	
	0/10V	
	0/20mA	
	4/20mA	
	0/135Ω	
	135/1000Ω	
	NTC	Temperature control
	0/1V	
	2/10V	
	0/10V	
	0/20mA	
	4/20mA	

Tab. 4.n

4.4.4 Room humidity (or temperature) probe configuration

Used to set the minimum value, maximum value and offset for the room probe.

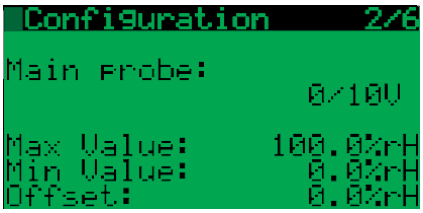


Fig. 4.n

info shown on display	value and notes	Default	unit of measure
Configuration	heading		
Main probe	Type of probe	0/1V	
Max	Maximum probe value reading	100.0	°C/°F - %rH
Min	Minimum probe value reading	0.0	°C/°F - %rH
Offset	Probe reading offset	0.0	°C/°F - %rH

Tab. 4.o

Note for T control: the minimum and maximum probe value settings are only in degrees centigrade.
The offset, on the other hand, being the difference between the probe measurement and the reading of a reference thermometer, depends on which unit of measure has been set.
Assuming that the Imperial system has been selected, and the measurements read by the probe are 2 °F higher than the readings on a reference thermometer. To correct this error, the offset must be set to -2.0 °F).

4.4.5 Limit probe configuration

This screen is used to set the type of limit probe, the minimum value, maximum value and offset.

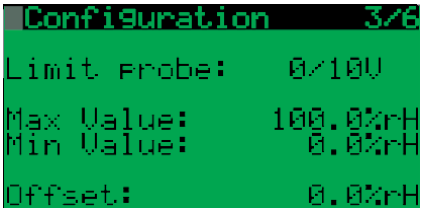


Fig. 4.o

info shown on display	value and notes	Default	unit of measure
Configuration	heading		
Limit probe	Type of probe	0/1V	
Max	Maximum probe value reading	100.0	%rH
Min	Minimum probe value reading	0.0	%rH
Offset	Probe reading offset	0.0	%rH

Tab. 4.p

4.4.6 Type of water

This screen is used to select the type of water used by the humidifier (mains or treated).
If selecting "treated water", the number of evaporation cycles before performing a drain to dilute cycle also needs to be set. This is not necessary in the case of mains water, as the software determines the frequency of the drain cycles based on the conductivity meter reading or the set conductivity value (also see 4.4.11)

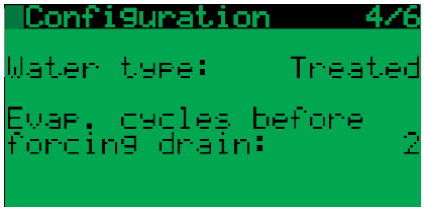


Fig. 4.p

info shown on display	value and notes	Default	unit of measure
Configuration	heading		
Water type	Type of water used (mains/treated)	Treated	
Evaporation cycles before draining	Number of evaporation cycles to be performed before running a drain to dilute cycle	2	

Tab. 4.q

4.4.7 Operating hour limit for maintenance exceeded warning

gaSteam features a limit of 1500 humidifier operating hours beyond which maintenance is recommended (see MAINTENANCE). When this happens, the display shows the maintenance warning. The warning can be disabled on screen 6/6 of the "Installer/Configuration" menu.

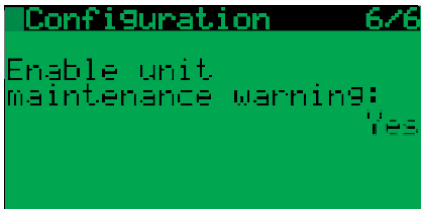


Fig. 4.q

4.4.8 Setting the "operating sequence of the two burners" (UG180 only)

gaSteam 180 manages operation of two burners in such a way that in steady operation, these deliver 180 kg/h of steam. Ideally, gaSteam 180 can be considered as two separate humidifiers, each with its own burner and able to produce up to 90 kg/h.
The controller manages these two systems based on the "Burner Sequence" setting, shown in the previous table.

- "PARALLEL" mode: the steam request is divided equally between the burners. In this case, therefore, the steam production provided by the two burners is the same.
- "SERIES" mode (also called "sequential"): if the steam request is less than 50% of the rated production, only one burner is operated. Only if the request exceeds the 50 % does the other burner start.

As each burner must operate so that the corresponding "ideal" humidifier produces a minimum of 25% (for natural gas; 33% for butane-propane) of the "ideal" flow-rate of 90 kg/h, "SERIES" mode naturally offers a wider overall range of modulation of steam production.

- PARALLEL mode: the minimum possible production is 45 kg/h;
- SERIES mode: minimum production is 22.5 kg/h

Example of PARALLEL mode

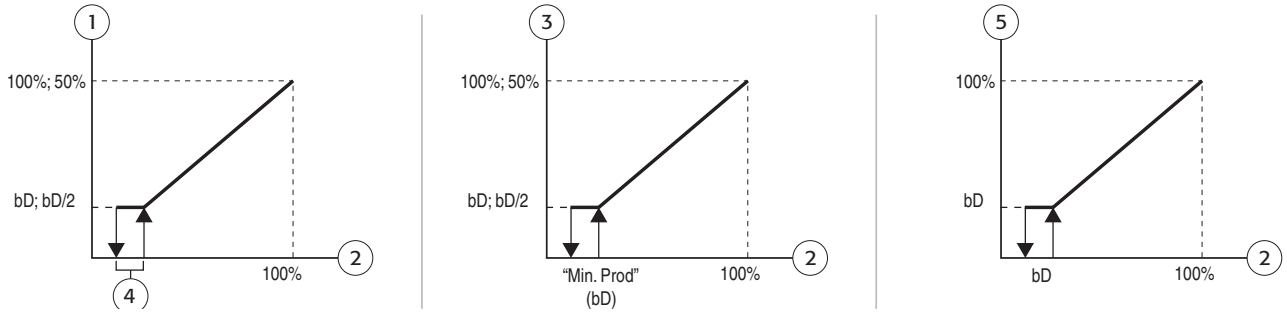
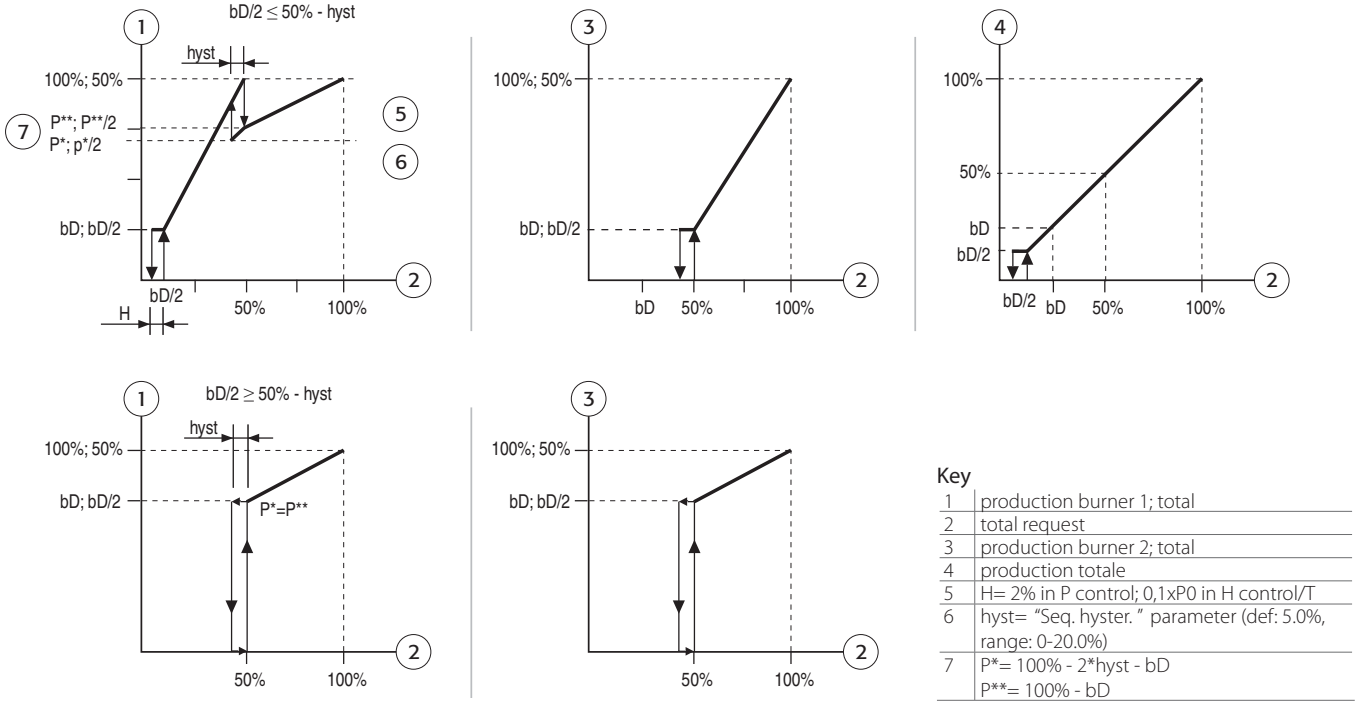


Fig. 4.r

Key

1	production burner 1; total
2	total request
3	production burner 2; total
4	2% in P control; 0.1xP0 in H/T control
5	total production

Example of Series mode



Key

1	production burner 1; total
2	total request
3	production burner 2; total
4	production totale
5	H= 2% in P control; 0,1xP0 in H control/T
6	hyst= "Seq. hyster. " parameter (def: 5.0%, range: 0-20.0%)
7	P*= 100% - 2*hyst - bD P**= 100% - bD

Fig. 4.s

It can be seen that an hysteresis is required in the intermediate burner On/Off zone, which is managed by the "Hyster. seq." parameter seen in the previous table. To offer a wider range of modulation in parallel mode, the concept of "ROTATION" has been introduced (see OPTIONS - Rotation of the request between the burners). If ROTATION is active, in PARALLEL mode too one burner is started first, while the other remains off until the steam request is between 12.5% and 25%. Above 25%, both burners start operating in parallel mode.

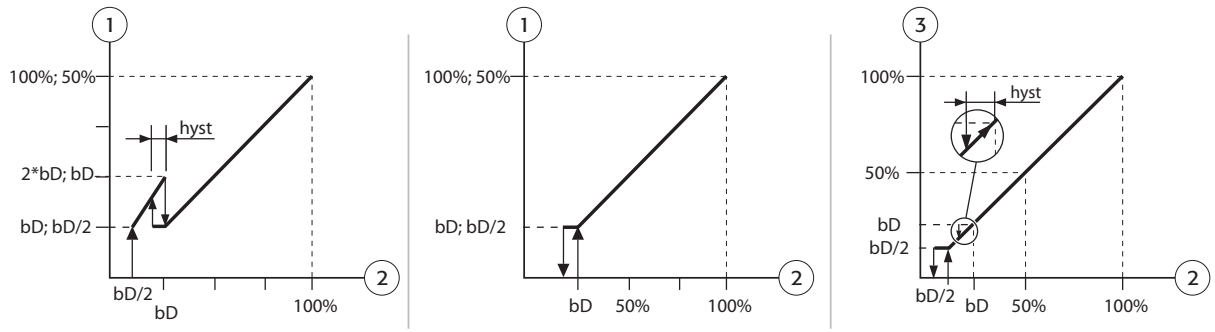


Fig. 4.t

key

1	production burner 1; total
2	total request
3	production burner 2; total

4.4.9 Control

The control parameters are the values corresponding to the humidifier control mode configuration.
These parameters must only be modified by qualified personnel.

Control parameters:

Screen	Display	Range	Default	UOM	Accessible	Description
1/7	Enable Autotest	No Yes	Yes	-	always	Enable Autotest function at start-up (see Chap. 4.4.9)
	Burner rotation(GaSteam 180 only)	No rotation In production At start	No rotation	-	always	Enable rotation and burner rotation mode (see Chap. 4.4.7, 4.4.10)
	Rotation time	1 to 999	10	h	if rotation is enabled	Hour threshold for the rotation of the burners
2/7	Override conductivity val.	0 to 9999	0	µS/cm	Always	Conductivity value. If set to any value other than 0, this overrides the reading of the conductivity meter located in the water inlet circuit
	Warning threshold	0 to (alarm threshold)	1000	µS/cm	Always	High water conductivity pre-alarm threshold
	Alarm threshold	(warning threshold)…2000	1250	µS/cm	Always	High water conductivity alarm delay
3/7	Fan speed at minimum production	0 to 9999	-	Rpm	Always	Fan speed at minimum humidifier production
	Rated	0 to 9999	-	Rpm	Always	Fan speed at rated humidifier production
	Pre-purge	0 to 9999	-	Rpm	Always	Fan speed in pre-purge stage
4/7	Type of fill valve	18 l/h 10 l/h	10 l/h	-	Always	Rating of the water fill valve (set from manufacturer)
	Fill/drain ratio	1…50	-	-	Always	Ratio between fill/drain (set by manufacturer)
	Hour threshold for drain due to inactivity	12 24 36 48 72	24	H	If drain due to inactivity is enabled (enabled by default and modifiable by manufacturer)	
5/7	Type of preheating	Disabled Temperature Temperature + Humidity	disabled	-	Always	
	Set point	50.0 to 90.0°C/ 122.0 to 194.0°F	80.0°C/176.0°F	°C/°F	If preheating is enabled	
	Offset	2.0 to 20.0	3.0	°C/°F	If preheating is enabled	
	Hysteresis	2.0 to 5.0	2.0	°C/°F	If preheating is enabled	
6/7	Min. prod ramp – 100%	0 to 99	0	min	Always	Setting of ramp time to increase from minimum production to 100%(see chap. 4.4.17)
	Frost protection	no yes	no	-	Always	Enable the frost protection function(see chap. 4.4.18)
	Set point	7.0 to 25.0°C/ 44.0 to 77.0°F	7.0°C/44.6°F	°C/°F	If frost protection is enabled	Frost protection temperature set point
7/7	Enable. dehumidify	no yes	no	-	Always	Enable function dehumidification
	Alarm relay logic	N.O. N.C.	N.O.	-	Always	Operating alarm relay logic
	Drain maintenance warning	no yes	yes	-	Always	Enable drain maintenance warning

Tab. 4.r

4.4.10 Initial autotest

This is an automatic procedure used to check the correct status of the fill valve, drain pump and level sensor.
The procedure is as follows:

- the boiler is filled until reaching the highest level of the level sensor;
- a drain cycle is performed until reaching the lowest level of the level sensor.

The procedure is completed without activating the burners.

IMPORTANT: In these conditions, the autotest occurs whenever the controller is switched off and on again

4.4.11 Rotation of steam request between the two burners (UG180) only

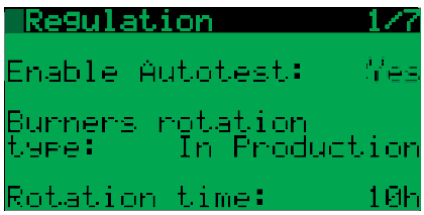


Fig. 4.u

Info shown on display	Value and notes	Default	unit of measure
Control	heading		
Enable autotest	Enable autotest	Yes	
Type of burner rotation	Type of rotation between burners	No rotation	
Time diff.	Burner rotation threshold	10	h

Tab. 4.s

In normal operation, depending on the humidity request and the control mode selected (series or parallel), the control logic automatically calculates how much energy must be generated by each burner/fan system.
Rotation involves periodically reversing these production references.
Rotation ensures, in the long term, similar operating hours for the two burners on the gaSteam, with the consequence of not only having more uniform wear on the combustion systems, but also a more uniform accumulation of scale deposits on the two heat exchangers.
Two types of rotation are available:

- IN PRODUCTION: this is rotation by time, that is, whenever the difference in operating hours between the two burners reaches 10 hours, the production references are reversed.
- AT START: whenever steam production ends and the subsequent request is received, the burner with the lower number of operating hours always starts first, along as the difference in operating hours has exceeded 10 h.

NOTE: The difference between operating hours considered for rotation can be changed using the "Time diff." parameter, available on the screen used to enable rotation, once rotation has been enabled

4.4.12 Overriding the supply water conductivity setting and setting the conductivity alarm thresholds

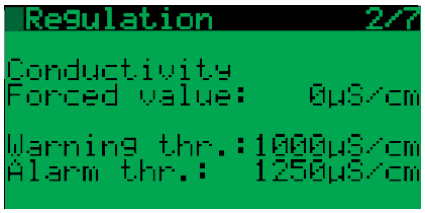


Fig. 4.v

Info shown on display	Value and notes	Default	unit of measure
Control	heading		
Override conductivity value (*)	Conductivity value set manually	0	µS/cm
Warning threshold	Conductivity warning threshold	1000	µS/cm
Alarm threshold	Conductivity alarm threshold	1250	µS/cm

Tab. 4.t

The conductivity of the supply water, as well as normally being monitored to prevent excessively conductive water from entering ("High conductivity alarms" - see "Alarms"), is also useful for determining the limit of fill/evaporation cycles between two drain to dilute cycles.
A special parameter can be set with a water conductivity value that overrides the value read by the conductivity meter. Leaving the default value "0" means the conductivity meter reading will be used. A value ≠ "0" indirectly affects the maximum number of evaporation cycles between two drain to dilute cycles: the lower the set conductivity, the higher the maximum number of cycles.
The limit values for the high conductivity warning and alarm can also be set on the same screen.

NOTE: (*) Supply water conductivity:

- Override value = 0: the controller uses the conductivity measured automatically by the conductivity meter;
- Override value <> 0: the controller uses the value of b4 as the conductivity and IGNORES the value measured by the conductivity meter.

IMPORTANT: this is valid when disabling "treated water" mode - see par. 4.4.6

4.4.13 Setting the fan speed

Fig. 4.w

Info shown on display	Value and notes	Default	unit of measure
Control	heading		
Fan speed. in minimum prod.	Fan speed setting at minimum production	1900 (depending on the model)	Rpm
Rated	Fan speed setting at rated production	5150 (depending on the model)	Rpm
Pre-Purge	Fan speed setting in pre-purge	3450 (depending on the model)	Rpm

Tab. 4.u

Speed at minimum and rated production
These values are set by default by the manufacturer to ensure a correct air/gas mixture with natural gas.

Pre-purge speed
The pre-purge speed is shown in "RPM" and is normally set by the manufacturer based on the features of the combustion system and the gas fuel.

NOTE: These parameters must be set by expert personnel.

4.4.14 Drain due to inactivity

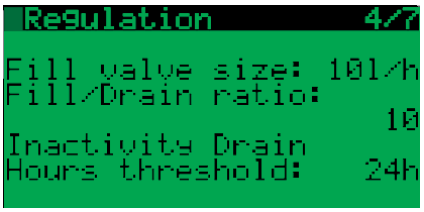


Fig. 4.x

Info shown on display	Value and notes	Default	unit of measure
Control	heading		
Fill valve size	Flow-rate of the water fill valve	10 (depending on the model)	l/h
Fill/drain ratio	Ratio between fill and drain	10	
Hour threshold	Operating hour threshold to activate drain due to inactivity	24	h

Tab. 4.v

The drain due to inactivity is used to completely empty the water from the cylinder if the cylinder does not produce steam for a period set on the screen (24 hours by default)
The function is enabled by default.

NOTE: The operating hour threshold for activation of the drain cycle can be selected from the following options: 12, 24, 36 or 48 h.
Hours of inactivity do not include the burner being started for frost protection or preheating.

4.4.15 Setting the maximum ratio between the water filled and the water drained for dilution

During normal operation, the gaSteam periodically performs drain cycles, called drain "to dilute", followed by refilling with supply water. These drain cycles have the fundamental task of reducing the high conductivity of the water inside the boiler due to the continuous concentration of salts during the repeated fill/evaporation cycles.

When supplying with untreated water, the controller automatically calculates, based on the conductivity of the water measured by the conductivity meter or the set conductivity value (see 4.4.12), how many evaporation cycles must be completed before performing the dilution.

Generally, the higher the conductivity measured/set, the higher the number of drain/fill cycles will be performed to reduce the concentration of salts in the boiler.

4.4.16 Preheating

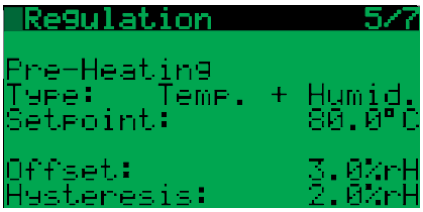


Fig. 4.y

Info shown on display	Value and notes	Default	unit of measure
Control	heading		
Type of preheating	Type of preheating	Disabled	
Set point	Temperature set point for preheating	80.0	°C/°F
Offset	Humidity offset to start preheating	3.0	%rH
Hysteresis	Humidity hysteresis to start preheating	2.0	%rH

Tab. 4.w

The preheating function is used to keep the water above a temperature set by the user when no steam production is needed. Preheating thus speeds up the return to steam production when next required.

There are three options:

1. Preheating disabled;
2. Preheating enabled: operation by temperature + restriction on %rH.
3. Preheating enabled: operation with temperature control only.

Operation by temperature + restriction on %rH

In classic operation, preheating is controlled depending on the water temperature and is activated according to the value read by the humidity (in H control) or temperature probes (in T control) or the signal applied (in P control).
This is enabled by setting "TEMP. + %rH" from the preheating options.

Preheating is activated depending on the humidity value measured by the probe and by the operating mode set.
In C mode (ON/OFF) preheating is never activated.
In P mode (proportional) preheating is activated and deactivated depending on the signal applied to the room probe input.
By default, preheating is activated when the signal applied exceeds 3%, while it is deactivated when it falls below 1% (see Fig. 4.u).
In humidity control mode, preheating is activated when the relative humidity falls below the "humidity set point + preheating offset - hysteresis" and is deactivated when it rises above the "humidity set point + preheating offset" (see Fig. 4.u).

The values of the preheating offset and hysteresis parameters can be changed from the default values.
These must be as follows:

Preheating offset: Range= 2.0 - 20.0 [°C] ; Default= 3.0 [°C]

Hysteresis: Range= 2.0 - 5.0 [°C] ; Default= 2.0 [°C]

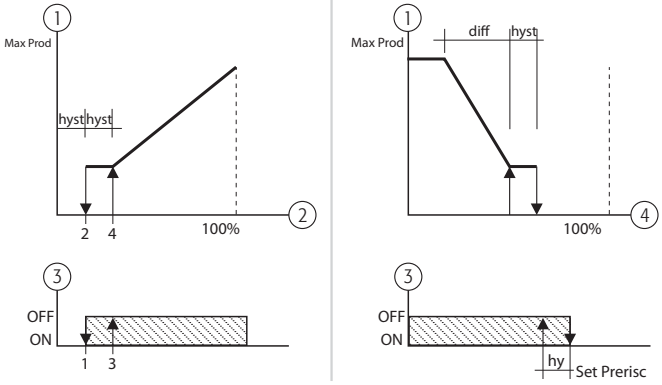


Fig. 4.z

Key

1	% reference for the burner
2	temperature
3	fixed differential of 20 °C
4	preheating temperature (def.: 80 °C)

Once preheating is activated, heating is modulated by the systems (burners + fans) depending on the water temperature measured by the NTC probe and the "preheating set point" (see Fig. 4.v).
The preheating set point temperature is a parameter with a range of 70T-90°C and a default of 80 °C.

When enabled, the preheating function starts the burners to preheat the water even if the unit is "Off".

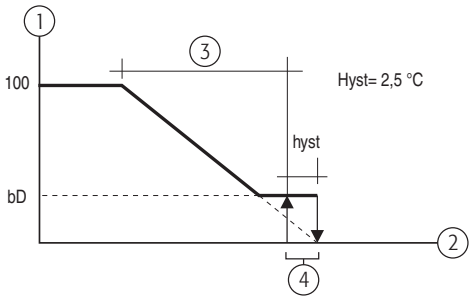


Fig. 4.aa

Key

1	% reference for the burner
2	temperature
3	fixed differential of 20 °C
4	preheating temperature (def.: 80 °C)

Operation with temperature control only

In this case, preheating is always enabled, that is, it is not activated depending on the humidity value or the temperature measured by the external probe.
The reference for the combustion systems only depends on the water temperature measured by the NTC probe and by the preheating set point, as illustrated in the previous graph.
This option is enabled by choosing the "TEMPERATURE" option.

Preheating the water in the boiler when starting the unit.

To speed up the start of steam production, irrespective of the type of control set, the unit always preheats the water in the boiler.
During this stage, with the unit on and steam demand, production is at the maximum possible value for the model in question until the water reaches a temperature of 80°C.
Once having reached this preheating threshold, production is modulated according to need.

4.4.17 Setting the production ramp

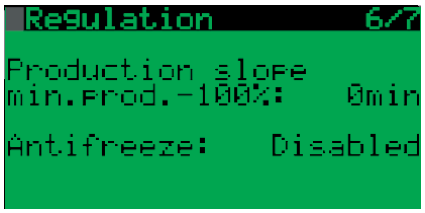


Fig. 4.ab

Info shown on display	Value and notes	Default	unit of measure
Control	heading		
Production ramp Min.prod-100%	Production ramp time setting	0	Min
Frost protection	Enable frost protection	Disabled	
Set point	Frost protection set point	7.0	°C/°F

Tab. 4.x

During operation, the steam request may change depending on the readings of the probes or the signal from the external controller.
The speed at which the humidifier shifts to the new request can be slowed down by setting the "Prod ramp." parameter on this screen. The value set for the parameter causes the following behaviour:

- parameter set to 0: the control logic uses an internal ramp (30 s) to shift from one request to the next;
- parameter set to a value other than 0: the logic recalculates the fan speed variation step, based on the assumption that to change from 0 to 100% of production must take the time set for this parameter.

4.4.18 Frost protection

This option can be very useful in applications that feature the installation of the gaSteam outdoors, especially in colder countries where there is the real risk that, if no steam is requested, the water inside the boiler might freeze. For this reason, an option has been added that starts heating the water if the temperature measured by the NTC probe is too low..
The humidifier must be activated and continuously connected to the power and gas supplies, excluding any interruptions. The frost protection function acts as illustrated in the following graph
(Fig. 4.z).

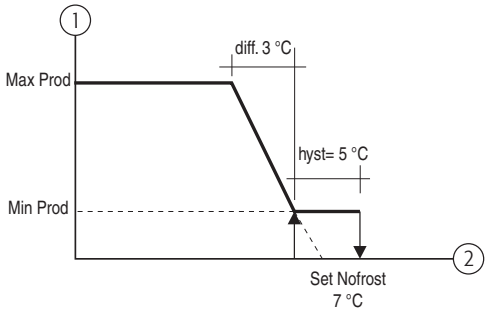


Fig. 4.ac

Key

1	% reference for the burner
2	NTC temperature

When enabled, the frost protection function - like preheating - starts the burners even when the unit is Off.

4.4.19 Dehumidification

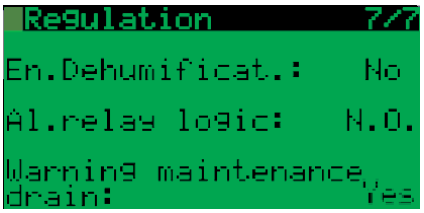


Fig. 4.ad

Info shown on display	Value and notes	Default	unit of meas.
Control	heading		
Enable dehumidify	Enable dehumidification	No	
Alarm relay logic	Operating logic of the alarm relay	N.O.	
Drain maintenance warning	Enable maintenance alarm	Yes	

Tab. 4.y

The dehumidification function is only possible if terminals 13U - 14U on terminal block U are connected electrically to a dehumidifier (see par. 3.2). By default dehumidification is not enabled. During normal operation, dehumidification may occur only if the following conditions are met:

1. the dehumidification option is enabled;
2. the room humidity probe is connected;
3. the humidifier has not been disabled by "Remote ON/OFF";

If these conditions are met, the dehumidification process is activated depending on the humidity measured, based on the "dehumidification set point" and "dehumidification differential" parameters, as shown in the graph (Fig. 4.a.a)

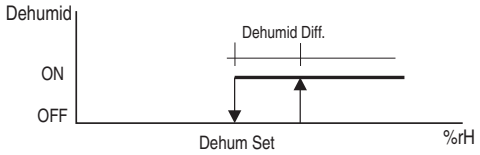


Fig. 4.ae

Once dehumidification has been enabled, the "set point" and "differential" parameters can be modified.
To do this, go to the quick set menu and press DOWN

Fig. 4.af

Info shown on display	Value and notes	Default	unit of meas.
Quickset	heading		
Dehumidif. set point	Dehumidification set point	100.0	%rH
Dehumidif. Differ.	Dehumidification differential	5.0	%rH

Tab. 4.z

4.4.20 Reversing the logic of the alarm relay

Normally, the alarms that stop the humidifier energise the coil in the alarm relay.
This logic can be reversed, so that the coil remains energised when no alarm is present, and is de-energised when an alarm is activated..

4.4.21 Supervision

The Supervision submenu contains the configuration parameters for the BMS supervisor port and, if selected, the configuration parameters for the GSM modem.

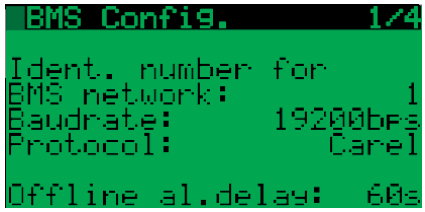


Fig. 4.ag

Info shown on display	Value and notes	Default	unit of measure
BMS config.	heading		
BMS network ID number	Serial address of the device	1	
Baud rate (*)	Communication speed	19200	Bps
Protocol (**)	Communication protocol	Carel	
Offline alarm delay	Delay for activation of the supervisor offline alarm	60	sec

Tab. 4.aa

(*) Baudrate:
- 1200bps;
- 2400bps;
- 4800bps;
- 9600bps;
- 19200 bps.

(**) Protocols:
- Carel
- ModBus®
- LonWorks®
- RS232 (analogue modem connection);
- GSM (GSM modem connection).

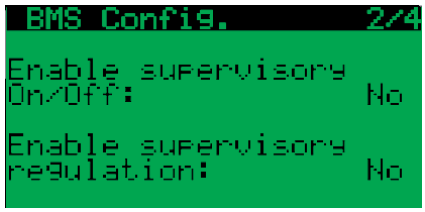


Fig. 4.ah

Info shown on display	Value and notes	Default	unit of meas.
BMS config.	heading		
Enable ON/OFF from supervisor	enable ON/OFF from the supervisor	No	
Enable control from superv. (*)	enable control from the supervisor	No	

Tab. 4.ab

(*) NOTE:
- control from the supervisor is used to manage the humidifier by sending a 0 to 1000 signal that is proportional to the SupervReg_Value variable – Analogue variable 29, available to the supervisor (see Chap. 7.4)
- When enabling control from the supervisor, the control mode is automatically set to "Proportional value from the supervisor.

4.4.22 Burner calibration

The Burner Calibration submenu is used to access the procedure for configuring and calibrating the burners on the humidifier.
Two types of procedure are available:
- Guided;
- Manual

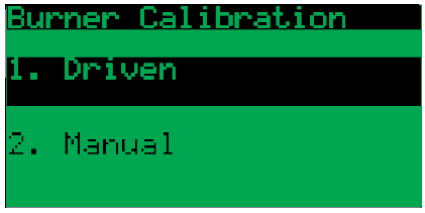


Fig. 4.ai

Two types of gas can be selected:
- Natural gas (G20-G25);
- LPG (G30-G31).

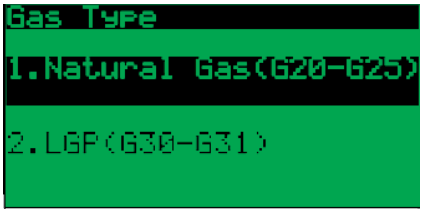


Fig. 4.aj

NOTE: On selecting the type of gas, the humidifier automatically sets all the control parameters for correct operation with that specific family of gas.

Burner calibration: GUIDED
Guided calibration is a step-by-step procedure that helps the installer correctly set up the burner.
It is divided into three different stages:
1. Calibration at maximum fan speed (maximum output delivered by the humidifier);
2. Calibration at minimum fan speed (minimum output delivered by the humidifier;
3. Verification of calibration at maximum output.

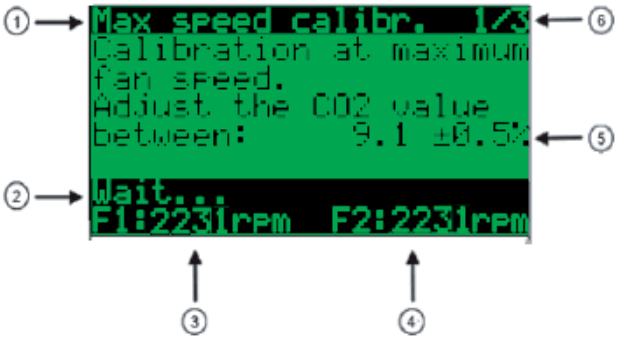


Fig. 4.ak

Symbol	function
(1)	name of the calibration stage
(2)	unit operating status/wait signal
(3)	fan speed no. 1
(4)	fan speed no. 2 (180kg/h only)
(5)	CO2 calibration values
(6)	number of the calibration stage

Tab. 4.ac

The first stage starts once the type of gas has been selected; the humidifier will be switched on, if off, and operated at the maximum output available. The screen will show info on the unit operating status, such as pre-purge, fan speed and waiting. Wait for the humidifier to reach maximum output, then calibrate the gas valve (see +030220940, chap. 5.6), adjusting it so that the percentage of CO2 measured is within the range shown on the screen.

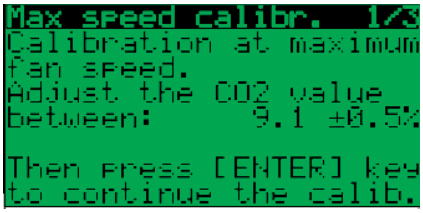


Fig. 4.al

Repeat the operations for the other two steps, following the instructions shown on the screen, to complete the calibration procedure.

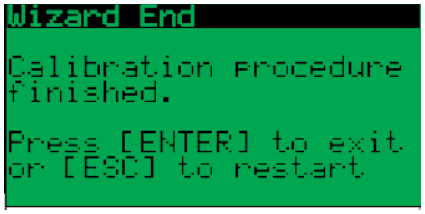


Fig. 4.am

Burner calibration: MANUAL
The manual procedure is used to set fan operating speed independently. For details on this procedure, see +030220940 chap. 5.6.

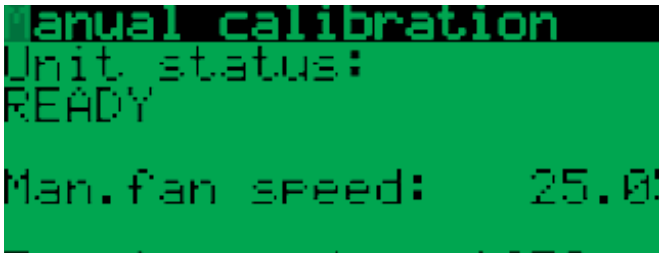


Fig. 4.an

Symbol	function
(1)	unit operating status
(2)	manual fan speed
(3)	fan speed no. 1
(4)	fan speed no. 2 (180kg/h only)

Tab. 4.ad

NOTE:
- The calibration menu can only be accessed if the humidifier is not in alarm status.

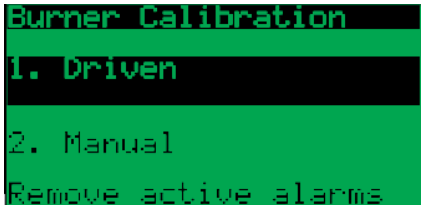


Fig. 4.ao

- If an alarm is activated during calibration, either guided or manual, the procedure will stop and the corresponding warning screen will be displayed.

Fig. 4.ap

- If during calibration no button is pressed for 5 minutes, the procedure will be interrupted and the unit will return to normal operation.

4.4.23 Installer settings

Il The "Installer Set" submenu is used to change the installer password (default 77).

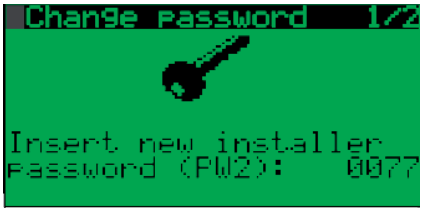


Fig. 4.aq

and enable the unit configuration wizard at start-up:

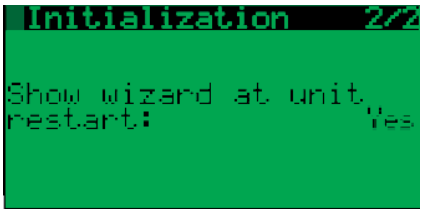


Fig. 4.ar

NOTE: When restoring the default values, the installer password will be reset to "77".

4.5 Maintenance

The Maintenance menu comprises two submenus showing information, with free access, and the "Service Parameters" submenu, only accessed after entering the maintenance password (default 77).

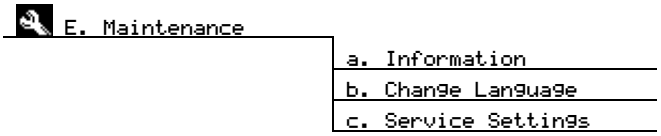


Fig. 4.as

4.5.1 Information

The Info submenu shows the main info on the humidifier's electronic controller.

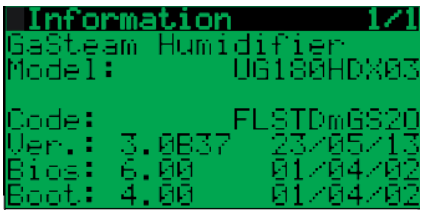


Fig. 4.at

Info shown on display	Value and notes	Default	unit of measure
Information	heading		
Model	humidifier model		
Code	software code		
Ver.	software version		
Bios	BIOS version and date		
Boot	BOOT version and date		

Tab. 4.ae

4.5.2 Change language

The Change Language submenu is used to set the language shown on the user interface and enable the change language screen when starting the unit.

4.5.3 Service parameters

The Service Parameters submenu is used to access, after entering the maintenance password, a submenu for setting the humidifier service parameters.

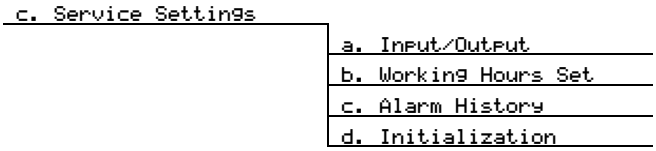


Fig. 4.au

4.5.4 Inputs/Outputs

The Inputs/outputs submenu is used to read all the I/Os available on the control board in real time, and manage the manual output test procedure.

I/O reading screen

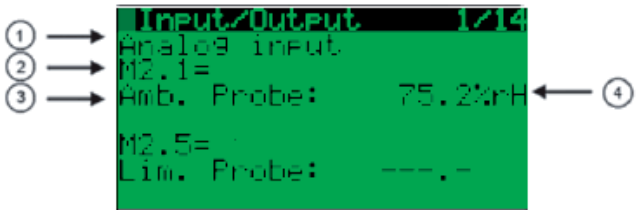


Fig. 4.av

Symbol	function
(1)	type of input
(2)	input name on the control board
(3)	description of the input
(4)	value read by the input

Tab. 4.af

Manual management – Digital outputs

These screens are used to manually control the device outputs (water fill, water drain, dehumidification, alarm) and the burners.

The function can only be activated if the unit has been switched ON from the Quick Set screen and is not OFF from digital input or supervisor

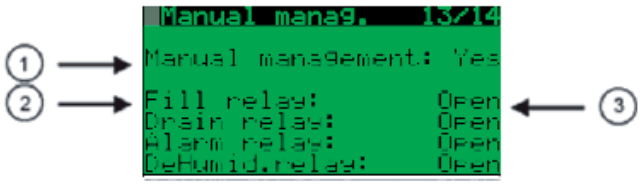


Fig. 4.aw

Symbol	function
(1)	enable manual management
(2)	digital output function
(3)	digital output status

Tab. 4.ag

Manual management – Burners

Fig. 4.ax

Symbol	function
(1)	burner name
(2)	manual request for corresponding burner
(3)	enable manual management of corresponding burner
(4)	manual request for corresponding burner
(5)	fan feedback on corresponding burner (read-only)

Tab. 4.ah

4.5.5 Hour counter settings

The Hour Counter Settings submenu is used to display humidifier operating hours, divided into three different counters:

- Unit;
- Burner 1
- Burner 2 (180kg/h only)

The unit hour counter represents the overall humidifier operating hours, irrespective of which and how many burners have been operated. It refers to all the common devices on the humidifier, which operate independently of which and how many burners are on (for example fill valve, drain pump). The burner hour counters, on the other hand, refer to the devices related to the operation of the individual burner (such as the fan, flame ignition board).

Fig. 4.ay

Info shown on display	Value and notes	Default	unit of meas..
Hour counter	heading		
Unit hours	unit hour counter reading	0	h
Burn. 1 hours	burner 1 hour counter reading	0	h
Burn. 2 hours (180kg/h only)	burner 2 hour counter reading	0	h
Reset hour counter	heading 2		
Burner 1	reset burner 1 hour counter	0	
Burner 2	reset burner 2 hour counter	0	

Tab. 4.ai

4.5.6 Alarm log

The Alarm Log submenu shows the log of past alarm events, highlighting the date and time of the event.

Fig. 4.az

Symbol	function
(1)	alarm event number
(2)	alarm event time
(3)	alarm event description
(4)	alarm event date

4.5.7 Initialisation

The Initialisation submenu is used to access the screen for restoring the humidifier default parameters and changing the installer password.

5. STARTING, SHUTTING DOWN AND ADVANCED FUNCTIONS

5.1 Start-up

Procedure and sequence

I – 0 switch: power (Fig. 5.a).

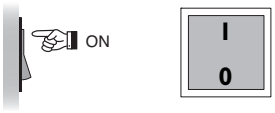


Fig. 5.a

After having closed the disconnect switch on the humidifier power supply line, switch the appliance on by moving the rocker switch to position "I". The start-up sequence then begins, which includes an initial stage followed by operation of the appliance.

After the unit has been switched on, the graphic display shows the screens in the sequence described in the figures below.

1. Start power supply and system boot (around 10 seconds)
   Nothing is displayed (Fig. 5.b);

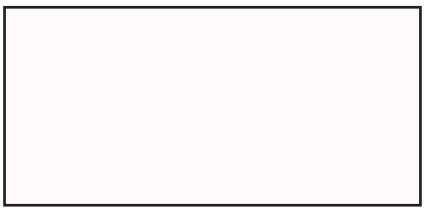


Fig. 5.b

2. Language setting (around 30 seconds)
   In this stage, the user has 30 seconds to change the language, see Fig. 5.c. To go directly to the next stage, press "ESC"

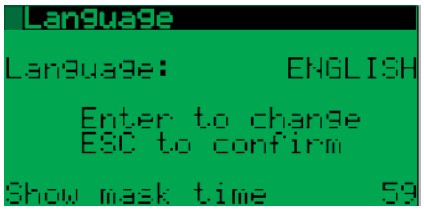


Fig. 5.c

3. Humidifier setup wizard
   When starting gaSteam, a brief wizard is displayed, prompting the user to select the basic configuration for humidifier operation. Press "ALARM" to confirm the settings displayed and exit the screen;

Fig. 5.d

Specifically, the type of control used, the probe configuration (if necessary) and the type of treated water need to be selected.

All the items set in the wizard can be changed subsequently in the Installer menu (see 4.4). The setup wizard when starting the unit can be disabled either at the end of the wizard itself same or in the Installer menu -> Installer settings.

5.2 Shutting down the unit

When shutting down the appliance at the end of the season or alternatively for maintenance on the electrical parts and/or water circuit, the humidifier should be placed out of service.

NOTE: empty the cylinder before shutting down the humidifier to prevent fouling.

Sequence:

- open the mains disconnect switch on the power line to the humidifier;
- move the rocker switch to 0 (see Fig. 5.g) and check that the display on the controller is off;
- close the shut-off tap on the water line to the humidifier.

Fig. 5.e

To empty the cylinder when shutting down, refer to par. 5.3.
In the event of a malfunction with the pump, or a malfunction with the electrical parts, the boiler can be emptied manually using the "manual drain tap" (Fig. 5.h), where it is necessary to connect a pipe to drain the water external.

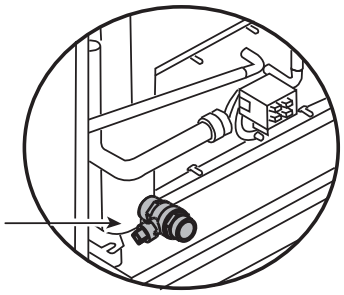


Fig. 5.f

5.3 Manually draining the boiler

The cylinder can be drained manually to complete empty the water contained inside.
This operation is particularly useful when maintenance needs to be performed on the boiler, the exchangers or the burners, or alternatively when the humidifier needs to be shut down at the end of the season.

The sequence to start the manual drain cycle is as follows:

- press the UP and DOWN arrows together for 5 seconds until the drain cycle is activated.

Once the drain cycle is terminated, the humidifier returns to the same operating conditions as prior to the drain cycle.

NOTE: the duration of the complete boiler drain cycle is preset. Nonetheless, manual drain can be stopped by pressing the UP and DOWN buttons again for 5 seconds.

If the cylinder needs to be replaced, when the manual drain is complete the humidifier must be switched off.

5. 4 Cascading control of other units

Steam production higher than the rated output of the master unit can be achieved by connecting one or more slave units:
- Master: UG unit fitted with analogue output for controlling other units;
- Slave: UG unit that works based on the analogue signal control received from the master.

Parameter P0 on each unit (master or slave) uniquely defines the steam production on that unit.
If the master is disabled by the remote contact or serial connection, production on the slaves also stops. Some alarms also shut down the slaves.

GRAPH

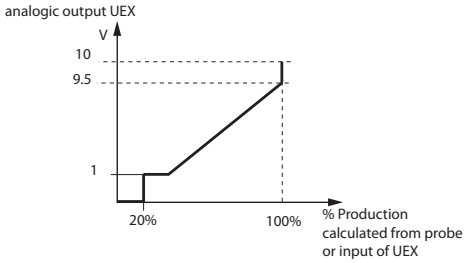


Fig. 5.g

Diagram: example 1

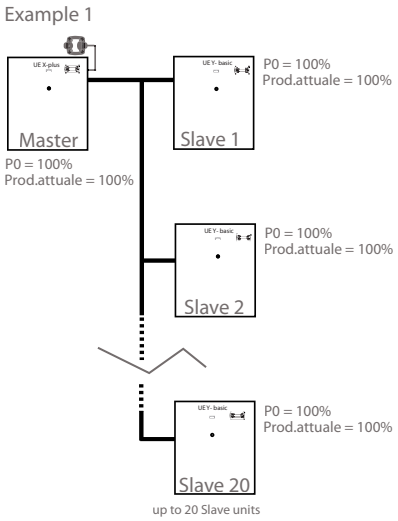


Fig. 5.h

Diagram: example 2

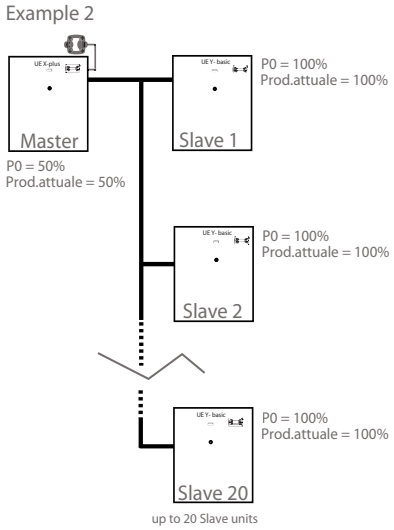


Fig. 5.i

Diagram: example 3

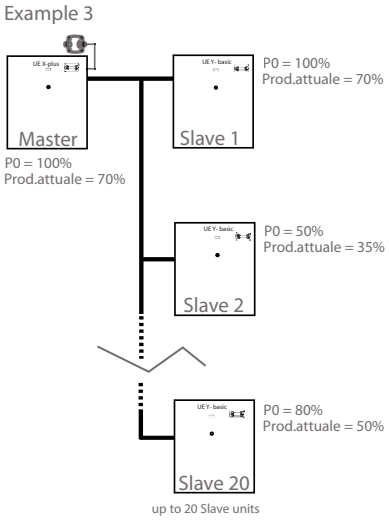


Fig. 5.j

Connection between UG Master & UG Slave
Use shielded cable for the connection.

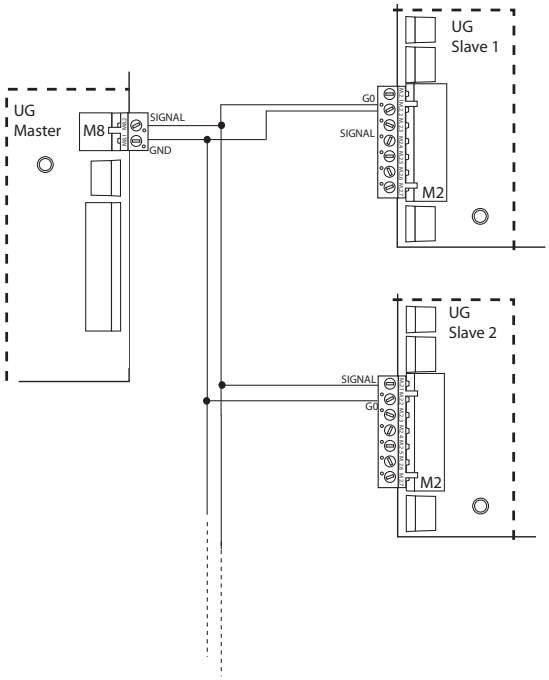


Fig. 5.k

6. ALARMS, TROUBLESHOOTING

6.1 Alarms

When an alarm is activated, the, the alarm button on the terminal comes on to indicate that there is at least one active alarm. In the event of potentially dangerous alarms, the controller automatically stops the production of steam.
For some alarm events, as well as the signal, the alarm relay is activated, as described in 3.1.
If the causes of the alarm are no longer present, the humidifier and alarm relay can be reset automatically or manually, depending on the type of fault (see Tab. 6.a), while the message displayed is cancelled manually.
Even if no longer active, the alarm status continues to be indicated until the "Reset display" button is pressed.
Alarms that are still active cannot be reset.
In the event where more than one alarm is active, the display indicates all the codes in sequence, only if after having pressed the alarm button once, the "Up" or "Down button is then pressed.

6.2 Alarm management and signals

Alarm table

Code	Message displayed (2)= alarm relating to cylinder 2	Meaning	Cause	Solution to the problem	Reset	Alarm relay	Action
B01	Alarm: No Flame	No flame when steam is required	• when the unit is on no steam is produced; • flue gas outlet or air inlet blocked; • gas valve closed, burner and/or controller fault; • no gas supply	• check gas pressure and make sure the gas valve is open; • make sure the air inlet is free; • check the fan power connection; • check operation of the brushless fan, the flue gas outlet and the air inlet; • burner flame malfunction; • check the connections between the flame control board and the burner, and between electrical panel and flame control; • check the connections between the control unit and relay terminal block inside the electrical panel	manual	active	stop production
B02 B03	Alarm: Gas card 1 (2) broken or not working	The gas card is not working properly	Card malfunctioning or broken	Check the correct wiring and operation of the gas card, otherwise replace it	manual	active	Stop production of relative burner
EF	Alarm: EF No water (Burners Off)	No water	no water	• check that the supply pipe to the humidifier and the internal tubing are not blocked or choked and that there is enough pressure (0.1-0.8 MPa, 1-8 bars); • check the operation of the fill solenoid valve and that the filter is clean; • check that there is not excessive backpressure in the steam outlet, causing activation of the overflow; • check that the steam outlet hose is not choked or that there are no pockets of condensate.	automatic	active	activate auto procedure
EC	Alarm: EC High conductivity (Burners Off)	High conductivity alarm	high supply water conductivity	• check the limit threshold set; • switch the unit off and clean the electrodes that measure water conductivity; if the problem persists, change the origin of the supply water or add a suitable treatment system, (demineralisation, even partial). N.B.: the problem cannot be resolved by softening the supply water.	manual	active	stop production
EC	Pre-alarm: Ec High conductivity	High conductivity warning	high water conductivity pre-alarm	• check the conductivity of the supply water; if necessary, add a suitable water treatment system. N.B.: the problem cannot be resolved by softening the supply water.	automatic	inactive	signal only
E-	Pre-alarm: E- High humidity	High humidity warning	high humidity in the room	check operation of the humidity probe and the limit value set for the upper limit parameter.	automatic	inactive	signal only

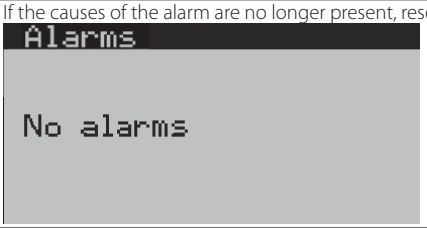
Code	Message displayed (2)= alarm relating to cylinder 2	Meaning	Cause	Solution to the problem	Reset	Alarm relay	Action
	Pre-alarm: E_ Low humidity	Low humidity warning	low humidity in the room	check operation of the humidity probe and the limit value set for the lower limit parameter.	automatic	inactive	signal only
E_	Pre-alarm: Low humidity	Low humidity warning	low humidity in the room	check operation of the humidity probe and the limit value set for the lower limit parameter	automatic	inactive	signal only
E>	Pre-alarm: High temperature	High temperature warning	high temperature in the room	check operation of the probe and the limit value set for the upper limit parameter	automatic	inactive	signal only
E_	Pre-alarm: Low temperature	Low temperature warning	low temperature in the room	check operation of the probe and the limit value set for the lower limit parameter	automatic	inactive	signal only
E=	Pre-alarm: Humidity alarm Limit probe	Pre-alarm high humidity in outlet	high outlet humidity	check the operation of the outlet probe	automatic	inactive	signal only
E3	Alarm: Room probe not connected or damaged	Main probe disconnected alarm	room probe not connected	check the connection of the probe, the parameter A2 for the room probe and the setting of parameter A0 (see chap. 4).	automatic	inactive	stop production
EA	Pre-alarm: EA Foam	Foam alarm	excessive foam in the cylinder during the boiling phase	the formation of foam is generally due to the presence of surfactants in the water (lubricants, solvents, detergents, water treatment or softening agents) or an excessive concentration of dissolved salts: • purge the water supply lines; • clean the cylinder; check for the presence of a softener (in this case, use another type of water or reduce the softening).	automatic	inactive	signal only
EU	Pre-alarm: Boiler Full	Cylinder full	cylinder full signal with unit off	with the unit off: • check for any leaks from the fill solenoid valve or the return of condensate from the pipe; check that the level sensors are clean.	automatic	inactive	signal only
EE	Alarm: Auto Test alarm (burners off)	Test alarm	Autotest failed; probable problems in water supply, level control or water drain cycle	make sure that the unit receives water (1-8 bars; 0.1-0.8 MPa; 14.5-116 PSI); • make sure that the unit drains water; • switch the unit off and clean the level control and the fill valve, the pump and the drain filter.	Manual; switch the unit off and on again a	active	stop production
E5	Alarm: NTC probe not connected or damaged	NTC probe disconnected	NTC water temperature measurement probe not connected	check operation of the preheating function and the setting of the parameters; check the connections on the terminal block on the cover of the boiler	automatic	active	preheating deactivated
ED	Fan warning 1 (2)	Fan warning on system 1 (2)	Fan error	check the wiring between the control board and the fan	automatic	inactive	reduced fan speed
Ed	Alarm: Fan alarm 1 (2) (burner 1 (2) off)	Fan alarm on system 1 (2)	Fan error	check the wiring between the control board and the fan;if necessary, remove the brushless fan and check operation.	manual	active	stop production on related burner
Et	Alarm: Klixon 1 (2) (burner 1 (2) off)	Thermostat alarm on system 1 (2)	Safety thermostat activated due to abnormal overheating of the cylinder due to operation without water	stop the unit and perform complete maintenance on the boiler	manual	active	stop production on related burner
G01	Clock card alarm	Clock error	General problems with the clock	replace the controller	manual	inactive	signal only
W01 W02	Warning: Alarm: High flue gas temp. (2)	High flue gas temperature (175°<T<180°)	Excessively high flue gas temperature, boiler caked with scale	switch the unit off, clean the heat exchanger, check burner calibration.	automatic	inactive	signal only
C01 C02	Alarm: High flue gas temp (2) (Burner off)	High flue gas temperature alarm (T>180°)	Excessively high flue gas temperature, boiler caked with scale	switch the unit off, clean the heat exchanger, check burner calibration	manual	active	stop production on related burner
EL	Pre alarm: EL - Level sensor blocked	Level sensor blocked warning	Scale on the sensor	carry out maintenance on the level sensor	automatic	inactive	activate auto procedure
EL	Alarm: Level sensor fault	Level sensor blocked alarm	No more attempts to unblock	carry out maintenance on the level sensor	manual	active	stop production
CL	Pre-alarm: Drain maintenance	Drain warning	Filter blocked, level sensor tube blocked, drain pump malfunctioning	carry out maintenance	automatic	inactive	signal only
CL	Alarm: Drain maintenance	Drain alarm	Filter blocked, level sensor tube blocked, drain pump broken	carry out maintenance	manual	active	stop production
E01	Alarm: Expansion card offline	pCOe Offline	Expansion card damaged or not connected	check serial board connections and correct power supply to the expansion	manual	active	stop production
A01 A02	Alarm: Flue gas temperature probe 1 (2) broken or disconnected	NTC flue gas probe disconnected	NTC probe for measuring flue gas temperature not connected or not working	check the probe connections	manual	active	stop production on related burner

Code	Message displayed (2)= alarm relating to cylinder 2	Meaning	Cause	Solution to the problem	Reset	Alarm relay	Action
O01	Alarm: Supervisor offline	Only with "Signal from supervisor" control: the supervisor is not available	No messages received from the supervisor for more than 30 seconds	• check correct wiring of the serial cable and remove any disturbance • make sure less than 30 seconds elapse between transmission of two consecutive messages from the supervisor	manual	active	stop production
W03	Warning: Unit maintenance	Production hour threshold exceeded warning	1500 operating hours exceeded	boiler maintenance recommended	manual	active	signal only

Tab. 6.a

6.2.2 Alarm table

The alarms are signalled by the flashing of the alarm button. The alarms are reset in the sequence shown in the following table:

sequence	effect
Pressed once	Display the alarm code. (NOTE: if there are multiple active alarms, to display all the alarms, after pressing the alarm button the first time, press "UP" or "DOWN".)
Pressed a second time	If the causes of the alarm are no longer present, resets the alarm and the alarm relay (in the alarms where this is activated).
Pressed a third time	If the causes of the alarm are no longer present, resets the alarm display and clears the following screen: 

Tab. 6.b

7. OPERATING AND CONTROL PRINCIPLES, OTHER FUNCTIONS

7.1 Operating principle

In a gas-fired humidifier, the production of steam is obtained inside a boiler containing water that is heated to and then held at boiling temperature.
The heat required to boil the water is provided by one or two burners that burn a mixture of air/gas. The heating capacity of the flame created due to combustion is modulated by adjusting the speed of the brushless fans fitted on the burners.
During the normal operation of the gaSteam, the level of the water is monitored using a three-float level sensor. In stable operation, there are repeated periods in which the water is filled and the level rises, and periods of evaporation in which the level falls. In these phases, the level remains between the middle and top floats.
Due to these repeated fill/evaporation cycles, the conductivity inside the boiler increases due to the progressive accumulation of salts introduced with the water. The control logic therefore periodically drains the water and replaces it with fresh mains water, so as to eliminate part of this excessive salinity.

7.2 Control principles

The range of humidifiers includes the following control options.

ON/OFF control

The action is all or nothing, activated by an external contact that determines the set point and the control differential.
The external contact may be a humidistat:

- closed: the humidifier produces steam if the remote ON/OFF contact is also closed;
- open: the production of steam ends after the completion of the evaporation cycle in progress (max. 10 to 15 min from the opening of the contact).

Note that if the remote ON/OFF contact opens, the production of steam ceases immediately, irrespective of the point that the current evaporation cycle has reached.

Proportional control

The production of steam (hourly quantity) is proportional to the value of a signal, Y, from an external device; the type of signal can be selected between the following standards: 0 to 1Vdc, 0 to 10Vdc, 2 to 10Vdc, 0 to 20mA, 4 to 20mA. The entire range is indicated as BP (proportional band).
The maximum production of the humidifier, corresponding to the maximum value of the external signal, can be programmed (by setting the Max.Product. parameter) from 25% to 100% of the rated output of the humidifier.
The minimum production, Min. Prod., has an activation hysteresis, hy, equal to 5% of the range BP of the external signal Y.

1. Steam production.
In the case of the UG180 humidifier, the following types of control sequence are available.

model	type of sequence	min. prod. range %	type of gas
UG180	parallel	25% - max prod.%	natural gas
	parallel with rotation	12.5% - max prod.%	
	series	12.5% - max prod.%	

Tab. 7.a

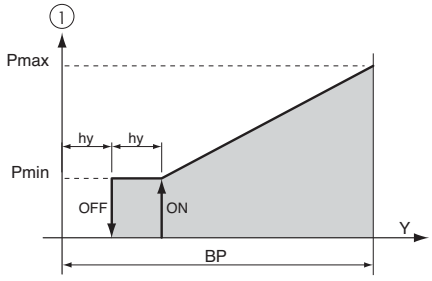


Fig. 7.a

Autonomous control with relative humidity probe

The production of steam is related to the % rH reading made by the relative humidity transducer connected to the controller, and increases as the value read deviates from the set point St. The maximum production, which is delivered when the relative humidity is less than the set point by a value at least equal to the differential ("H differential"), can be programmed (by setting the Max.Product. parameter) from 20% to 100% of the rated output of the humidifier, in operation with the parallel sequence, and from 10% to 100% in operation with the series sequence (see par. 4.3.5).
The minimum production, Min. Prod. (10% or 20%, depending on the operating sequence selected), has an activation hysteresis, hy, equal to 2% of the range.
The dehumidification function, if enabled (par. 4.4.11), overlaps the control diagram and is activated when the relative humidity % rH, sent by the transducer, is higher than St by a set amount ("dehum.offset"); the hysteresis of the step, also programmable, is "dehum.diff.".
To check that the relative humidity measured by the transducer is within certain preset values, two alarm thresholds can be set in autonomous control:

- high relative humidity alarm threshold;
- low relative humidity alarm threshold.

When these thresholds are exceeded, an alarm is activated, after a delay of 60 seconds.

1	steam production	3	dehumidification
2	activated	4	deactivated

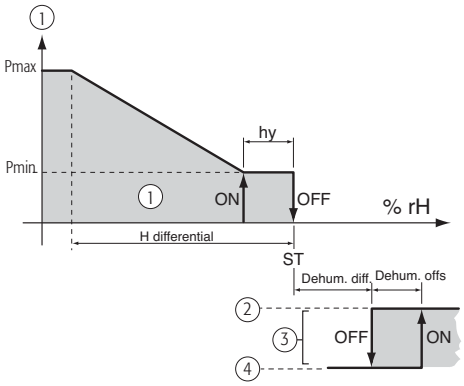


Fig. 7.b

Autonomous control with relative humidity probe and outlet humidity limit probe

The controller modulates steam production as a function of the % rH measurement performed by the relative humidity transducer, however, in addition, steam output is limited if the relative humidity % rH2 measured by a second compensation transducer placed in the air duct downstream from the humidifier exceeds the maximum desired value.
The compensation probe has its own set point ("L set point") and differential ("L differential"), based on which the limit in production is calculated (see Fig. 7.c).

The overall steam production is equal to the difference between the steam request from the main transducer and the request from the compensation transducer.

To prevent the relative humidity measured by the transducer in the air duct downstream from the humidifier exceeding a value considered as excessive, in this control mode a high outlet relative humidity alarm threshold can be set (also see par. 4.3.4).
This threshold is equal to the sum between the limit set point ("L set point") and an offset ("High Offset"). When this threshold is exceeded, an alarm is activated, after a delay of 60 seconds.

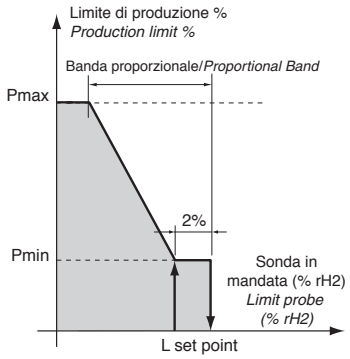


Fig. 7.c

Proportional control with compensation probe to limit outlet humidity.
The production of steam (hourly quantity) is proportional to the value of a signal, Y, from an external device; the type of signal, as for standard "Proportional control", can be selected between the following standards: 0 to 1 Vdc, 0 to 10 Vdc, 2 to 10Vdc, 0 to 20 mA, 4 to 20 mA. Maximum steam production, corresponding to the maximum value of the external signal, can be programmed (by setting the Max.Product. parameter), from 25% to 100% of rated output of the humidifier.

In addition to the production request received from the external signal, the controller also limits steam production if the percentage (%rH2) measured by the compensation transducer installed in the air duct downstream of the humidifier exceeds a set value.

The operating logic of this mode is conceptually similar to "Autonomous control with relative humidity probe and outlet humidity limit probe" as described in the previous paragraph, with the only difference being that main steam production (which limits are then applied to, depending on the limit probe) is proportional to the value of the external signal and not calculated by the controller based on the reading of a humidity probe.

See the previous sub-paragraph for details on the operating logic of this control mode.

7.3 Other functions

Measuring the conductivity of the supply water

The controller measures the conductivity of the supply water.
The measurement is made using the conductivity meter by opening the fill solenoid valve.
The field of reading ranges from 0 to 1500 µS/cm. Two thresholds are available:

- **pre-alarm threshold (signal only, without activating the alarm relay, and automatic reset when the condition is no longer present**);
- **alarm threshold (production stops, activation of the alarm relay**).

The alarm is activated when the reading exceeds one of the two thresholds continuously for 60 minutes, or alternatively instantly if the value read is 3 times higher than the threshold.
To disable either of these thresholds, simply set the corresponding value to a number outside of the field of reading the conductivity meter, that is, greater than 1500 µS/cm.

Measuring the flue gas temperature

The temperature of the flue gas is constantly monitored so as to ensure correct operation. The field of reading ranges from 0 to 200°C. Within these limits a number of operating thresholds are set:

- no production threshold: if the flue gas temperature falls below this value, it means that the burner is not on and the no production alarm (Ep) is activated;
- pre-alarm threshold: first upper threshold, above this value the recommended maintenance warning is activated. Also used to switch the burner to safety mode following abnormal operation with insufficient water in the boiler;
- alarm threshold: above this value production is stopped and the high temperature alarm (ER) is activated

The alarms or warnings are activated if the temperature reaches and then stays above these thresholds for at least 20 seconds. In the case when the pre-alarm threshold is used to switch off the burner in certain situations, such as drain cycles that last too long, activation is brought forward to 4 seconds.

Automatic draining

Automatic draining is managed by the controller: part of the water contained in the cylinder is drained automatically, and replaced with fresh water to prevent an excessive concentration of salts following the process of evaporation.
The drain pump is operated for a set time when the number of fill/evaporation cycles exceeds a limit calculated automatically, based on the conductivity read by the conductivity meter.

Antifoam procedure

With certain types of supply water, foam may form during the production of steam just above the water; this situation must be resolved, as it may cause water to be released together with the steam.
For this purpose, two electrodes are fitted on the ceiling of the cylinder. When these electrodes detect the presence of foam, a drain procedure is started to resolve the problem. The procedure consists of repeated drain cycles, while in more extreme situations, the "foam present" pre-alarm is shown.

Dehumidification request signal

If activated, this function closes the contact of a relay when the relative humidity measured by the transducer connected to the control module exceeds the set threshold. This signal can be used to start an external dehumidification appliance (also see par. 3.2)

Automatically empty the cylinder due to extended inactivity

If the cylinder remains on but without steam production for a number of days equal to the value set for the parameter described in par. 4.4.11 (default 3 days), the controller completely empties the water contained inside the cylinder. This function prevents the corrosion of the electrodes due to saline water if the humidifier is not operated for extended periods. The function can be disabled (see par. 4.4.11).

Automatic resumption from no water

If the supply of water is interrupted (mains water stoppage, fault in the osmosis or softening system), the controller stops normal operation and enters a special phase in which production is disabled so as to avoid dry operation. In this situation, the return of the supply water is checked every 10 minutes, and production is not resumed until water returns. During this phase the EF alarm is displayed.

7.4 Controlling the board via the network

The variables shown in the list are only one set of all the internal variables.
DO NOT CONFIGURE VARIABLES THAT ARE NOT LISTED IN THE TABLE, OTHERWISE HUMIDIFIER OPERATION MAY BE AFFECTED.

Address	Type	Access	Variable name	Description
1	DIG	R	SYSON	Syson
2	DIG	R	FILL_OUT	Fill solenoid valve ON
3	DIG	R	DRAIN_OUT	Drain solenoid valve ON
4	DIG	R	DEHUMIDIFIC	Dehumidifier relay ON
5	DIG	R	ACT_BURNER1	Burner 1 board power relay status
6	DIG	R	ACT_BURNER2	Burner 2 board power relay status
7	DIG	R	ACT_FAN1	Fan 1 power relay status
8	DIG	R	ACT_FAN2	Fan 2 power relay status
9	DIG	R	ALARM	Unit alarm
10	DIG	R/W	BMS_ON_OFF	On/Off from supervisor
11	DIG	R/W	EN_DEHUMID	Enable dehumidifier
12	DIG	R/W	ENABLE_HUM	Enable humidifier
13	DIG	R/W	RES_HOUR_BURN1	Reset burner 1 hour counter
14	DIG	R/W	RES_HOUR_BURN2	Reset burner 2 hour counter
15	DIG	R/W	RES_HOUR_GASTEAM	Reset GaSteam hour counter
16	DIG	R/W	MANUAL_DRAIN	Manual drain
17	DIG	R/W	EN_AUTOTEST	Enable autotest
18	DIG	R/W	EN_NO_FROST	Enable frost protection
19	DIG	R/W	MEASURE	Unit of measure
20	DIG	R	mal_ambient_probe	Control probe error
21	DIG	R	mal_clock	Clock card error
22	DIG	R	mal_fan1	Fan 1 alarm
23	DIG	R	mal_fan2	Fan 2 alarm
24	DIG	R	mal_foam_level	Foam alarm
25	DIG	R	mal_full_boiler	Boiler full alarm
26	DIG	R	mal_hig_conductivity	High conductivity alarm
27	DIG	R	mal_high_humid	High temperature/humidity alarm
28	DIG	R	mal_high_outlet_gas1	High flue gas temperature alarm burner 1
29	DIG	R	mal_high_outlet_gas2	High flue gas temperature alarm burner 2
30	DIG	R	mal_klixon_fan1	Fan 1 thermal cutout alarm
31	DIG	R	mal_klixon_fan2	Fan 2 thermal cutout alarm
32	DIG	R	mal_limit_humid	High humidity limit probe alarm
33	DIG	R	mal_limit_probe	Limit probe error
34	DIG	R	mal_low_humid	Low temperature/humidity alarm
35	DIG	R	mal_low_production	Low production alarm
36	DIG	R	mal_maint_global	Maintenance recommended
37	DIG	R	mall_miss_water	No water alarm
38	DIG	R	mal_preheating_probe	NTC preheating probe error
39	DIG	R	mPreAl_High_Conductivit	High conductivity pre-alarm
40	DIG	R	mLow_Level_Alarm	Minimum level alarm
41	DIG	R	mAutotest_Alarm	Autotest alarm
42	DIG	R	mAl_Pre_High_Outlet_Gas1	High flue gas temperature pre-alarm burner 1
43	DIG	R	mAl_Pre_High_Outlet_Gas2	High flue gas temperature pre-alarm burner 2
44	DIG	R	mal_ov_fan1	Fan 1 high speed alarm
45	DIG	R	mal_ov_fan2	Fan 2 high speed alarm
46	DIG	R/W	Res_Al	Reset alarms
47	DIG	R	MAN_Low_Level_Alarm	Level sensor blocked
48	DIG	R	mAl_Outlet_Gas_Probe_1_Broken	Flue gas temperature probe on burner 1 disconnected or not working
49	DIG	R	mAl_Outlet_Gas_Probe_2_Broken	Flue gas temperature probe on burner 2 disconnected or not working
57	DIG	R	Low_Level	Low float level sensor
58	DIG	R	Medium_Level	Medium float level sensor
59	DIG	R	High_Level	High float level sensor
60	DIG	R	Foam_Level	Foam level sensor
61	DIG	R	mAlrm_Offline_pCOe	pCOe offline
62	DIG	R	mAl_Missing_Flame_Brn1	No flame burner 1
63	DIG	R	mAl_Missing_Flame_Brn2	No flame burner 2
64	DIG	R	mAl_UnitMaintenance	1500 burner operating hours exceeded

Tab. 7.b

Address	Type	Access	Variable name	Description
1	INT	R	UNIT_STATUS	Humidifier status
2	INT	R	FAN_RPM1	Fan 1 speed
3	INT	R	FAN_RPM2	Fan 2 speed
4	INT	R	COND_PARAM	Conductivity measured
5	INT	R	BURNER1_STATUS	Burner 1 status
6	INT	R	BURNER1_ACTIVITY	Burner 1 activity
7	INT	R	BURNER2_STATUS	Burner 2 status
8	INT	R	BURNER2_ACTIVITY	Burner 2 activity
9	INT	R	RUNNING_HOURS_H1	Burner 1 operating hours- x1000
10	INT	R	RUNNING_HOURS_L1	Burner 1 operating hours
11	INT	R	RUNNING_HOURS_H2	Burner 2 operating hours- x1000
12	INT	R	RUNNING_HOURS_L2	Burner 2 operating hours
13	INT	R	RUNNING_HOURS_GH	GaSteam operating hours - x1000
14	INT	R	RUNNING_HOURS_GL	GaSteam operating hours
15	INT	R	MODEM_STATUS	Modem status
16	INT	R	LANGUAGE	Language selected
17	INT	R	HOUR	Current hours
18	INT	R	MINUTE	Current minutes
19	INT	R	DAY	Current day
20	INT	R	MONTH	Current month
21	INT	R	PYEAR	Current year
22	INT	R	WEEK_DAY	Current day of the week
23	INT	R/W	REGULATION_TYPE	Type of control
24	INT	R/W	AMBIENT_PROBE_TYPE	Room probe type
25	INT	R/W	ROTATION_TYPE	Type of rotation
26	INT	R/W	PREHEATING_TYPE	Type of preheating
27	INT	R/W	BMS_ADDRESS	Identifier number for BMS Network
28	INT	R/W	BAUD_RATE	Communication speed
29	INT	R/W	PROTOCOL_TYPE	Type of protocol
30	INT	R/W	CYL_SEQUENCE	Type of management requested (parallel, series)
31	INT	R	OUTLET_GAS1	Flue gas temperature 1
32	INT	R	OUTLET_GAS2	Flue gas temperature 2

Tab. 7.c

Address	Type	Access	Variable name	Description
1	ANA	R	VIS_VALUE	Control probe/signal
2	ANA	R/W	AMBIENT_PROBE_MIN	Room probe configuration minimum limit
3	ANA	R/W	AMBIENT_PROBE_MAX	Room probe configuration maximum limit
4	ANA	R/W	AMBIENT_PROBE_OFFSET	Room probe calibration offset
5	ANA	R	ACT_SETPOINT	Current set point
6	ANA	R	A_PRODUCTION	Current steam production
7	ANA	R	LIMIT_PROBE_VALUE	Signal applied to the limit probe input
8	ANA	R/W	LIMIT_PROBE_MIN	Limit probe configuration minimum limit
9	ANA	R/W	LIMIT_PROBE_MAX	Limit probe configuration maximum limit
10	ANA	R/W	LIMIT_PROBE_OFFSET	Limit probe calibration offset
11	ANA	R	NOMINAL_CAPACITY	GaSteam rated capacity
12	ANA	R	A_PRODUCTION1	Current production of combustion system 1
13	ANA	R	A_PRODUCTION2	Current production of combustion system 2
14	ANA	R	PREHEATING_PROBE_VALUE	Water temperature
15	ANA	R/W	MAX_PROD	Maximum production %
16	ANA	R/W	SET_HUMID	Humidity set point
17	ANA	R/W	DIFF_HUMID	Humidity differential
18	ANA	R/W	L_SETPOINT	Limit probe set point
19	ANA	R/W	L_DIFFERENTIAL	Limit probe differential
20	ANA	R/W	T_SETPOINT	Temperature set point
21	ANA	R/W	T_DIFF	Temperature differential
22	ANA	R/W	DEHUM_SET	Dehumidifier set point
23	ANA	R/W	DEHUM_DIFF	Dehumidifier differential
24	ANA	R/W	LOW_ROOM_HUMID	Low room humidity alarm threshold
25	ANA	R/W	HIGH_ROOM_HUMID	High room humidity alarm threshold
26	ANA	R/W	HIGH_LIMIT_HUMID	High outlet humidity alarm threshold
27	ANA	R/W	TEMP_PREHEATING	Preheating set point
28	ANA	R/W	NO_FROST_SETPOINT	Antifreeze set point
29	ANA	R/W	SUPERVREG_VALUE	Proportional control from supervisor

Tab. 7.d

CAREL reserves the right to modify or change its products without prior notice.

NOTE: _____

NOTE: _____

CAREL

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